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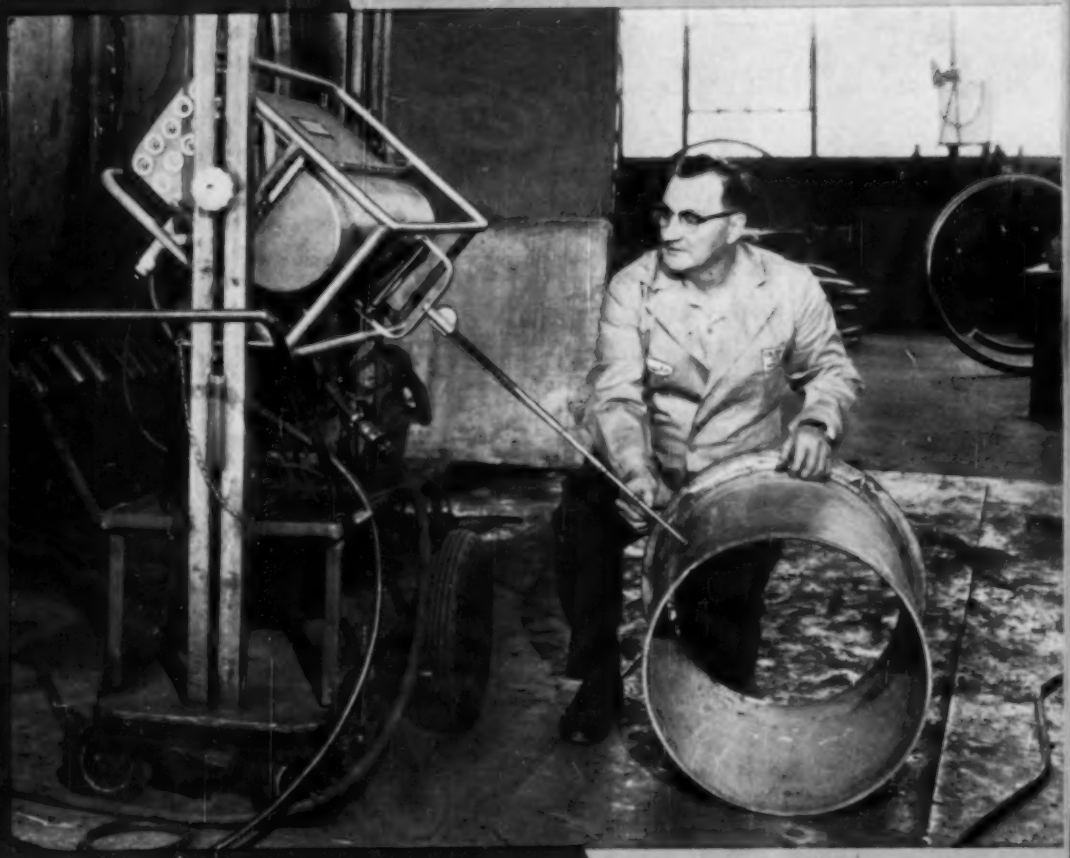

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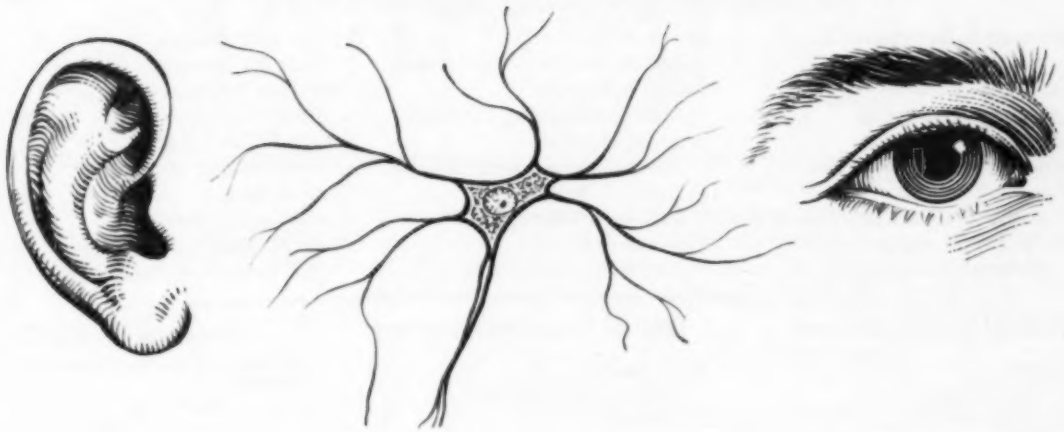

Bell Telephone Laboratories' new electronic "nerve cell" is a step toward finding out

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INDUSTRIAL QUALITY CONTROL

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Conducting In-Plant TRAINING SESSIONS In Statistics

J. L. JAECH and W. F. STEVENSON

THE title of this article suggests that there is a need for conducting training sessions in statistics in industry. This is true because the concepts of statistics are relatively new, and hence, what the statistical approach really means is not widely appreciated. There are no doubt many instances where quality control programs, for example, have been prematurely abandoned primarily because they were not really understood by the personnel involved. Similarly, in companies where there exists a trained force of statisticians ready to assist any and all in their varied problems, the number of personnel using such services is often unduly small because of this lack of appreciation for what statistics can do.

It is the duty of the individual trained in statistics to create in others such an appreciation for the statistical approach. Industry has very often given the statistician an opportunity to do this through industry sponsored courses. However, all too often, at the conclusion of such a course, (unless it is a comprehensive course of instruction) the statistician and the participants have the mutual feeling that little was accomplished. This is often attributed to the fact that "you just can't teach statistics in ten one-hour sessions." We do not disagree with this statement. It is undoubtedly true. What then is the solution to this problem?

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Based on a paper presented at the 7th Pacific Northwest Quality Control Conference at Portland, Oregon, Apr. 3, 4, 1959.

We have listed six points which we feel must be kept in mind in conducting a course in industry. These are:

(1) The purpose of the course is not to teach statistical techniques, but rather to create an awareness that statistical methods exist, and to develop a little appreciation as to how these techniques can be used.

(2) The approach should be inductive rather than deductive.

(3) The participants should be homogeneous with respect to background and job interests.

(4) The material presented should be restricted in scope.

(5) Realism should be achieved through the use of adequate training aids.

(6) The course should emphasize examples rather than formulas.

IT IS implied of course, that the instructor be duly qualified to conduct such a course. Optimum results are obtained only if he is not only well grounded in statistics, but also has a good feel for the practical problems of interest to the class participants. The above six points are considered in more detail.

WE BELIEVE that first of all one must face up to the fact that teaching formal statistical techniques in a short series of sessions is out of the question. Thus, point number (1) to remember is that the purpose of the course is not to teach these techniques but rather to create in the mind of the individual participant an awareness of what constitutes the statistical approach, plus an awareness that statistical techniques are available to assist him in his particular problems. Once this is accepted as the purpose of the course, the teaching approach will be changed in the fashion indicated in point (2). The participant is usually not interested in the logical development of the tools of statistics. This logical development is known as the deductive approach. He has a particular problem, and he wants to know how the statistical approach can help him. If this is how his interest is created in practice, why not use the same approach in teaching? That is, start out with a specific problem, and then consider how one might use statistics to aid in solving the problem. This is known as the inductive approach, and is of the utmost importance in creating motivation.

Point number (3) states that the

individual participants should be homogeneous with respect to background and job interests. This is perhaps an obvious point, but failure to recognize its importance has on occasion no doubt been a major factor in keeping a course from being successful. Along the same line, point (4) indicates that the material selected should also be restricted in scope and depend on the participants. One clearly cannot hope to cover all the areas of statistics, or even all the major areas. The meaning and importance of control charts, for example, could easily constitute one course. So could principles of acceptance sampling, or topics in design of experiments. Which of these the course emphasizes should depend on the interests and needs of the individual participants.

Finally, points (5) and (6) are closely related. We feel strongly that the proposed course should emphasize class participation built around data generated from given models. Although the use of tables of random numbers is perfectly acceptable to a statistician, it is in most cases not acceptable to a "practical" man in industry. He cannot accept the tie-in between the real world and a table of random numbers. Although bowls of numbered chips are a step in the right direction, they still leave something to be desired. We cannot underestimate the importance of achieving this realism. The course participant in industry is inherently suspicious of any variation induced by selecting random numbers from a bowl.

ONE then asks, "Cannot realism be achieved by taking actual data from a production line, or from a research laboratory?" Certainly the realism is there. Unfortunately, however, it is sometimes difficult to convince the participant that the answer found by the statistical approach is the "best" answer, because *the true situation is not known*. What is needed is a *realistic* training device which permits data generation from a known model so that the answers obtained by statistical methods can be compared with the true situation. Such a device, called a "Process Simulator," was designed and built by W. F. Stevenson at HAPO for just this reason.

Stevenson's Simulator is similar in appearance to the one designed by Joseph J. Moder, Jr. and described by him in the October, 1956 issue of *Industrial Quality Control*. However, certain unique features have been added, the most important of which, from the standpoint of creating realism, is the built-in feature of Stevenson's model with respect to the generation of the random error term. The instructor does not rely on random numbered chips to determine the random error associated with a given observation. Rather, the error is determined by the position at which a rotating disc inside the training aid stops when the sample is drawn. The "Process Simulator" is described in more detail in Appendix I, and it has been invaluable in bridging this gap between the theoretical structure and the real world.

AT HAPO we have had several opportunities to present courses in statistics. Each one taught us something additional with respect to how best to conduct such a course. The six points we have listed above are a direct result of this experience. The most recent course embodies these principles, and for the first time we felt that the course was by and large a success.

This course, consisting of only eight one-hour sessions, was presented to engineers associated with process experimentation in connection with the canning of uranium fuel elements. Twelve individuals participated. At each session, a written problem was assigned. These problems ranged from selection of sample sizes in a simple experiment, to locating the optimum set of "process" conditions through repeated experimentation. Teams were formed which considered the problem during the week and generated whatever data they required from the Process Simulator. At the next session, the various team approaches were compared with one another and with the statistical approach. Objective evaluations could be more easily made because of the ability of the Simulator to shut off all variation and reproduce the true situation. The realism was so great that in some of the discussions the participants forgot whether they were discussing a "made-up" example or a real, currently existing problem.

An example of a specific problem assigned during one of the sessions is given in Appendix II. This problem aroused unusual interest because it was closely related to a specific problem of current interest. Also, the discussions it evoked among the various team members as to how best to gather the data were quite informative in pointing out the many different ways in which one could proceed to attack a given problem. It was included in the series of sessions introducing the Box technique for the exploration of response surfaces.

At the conclusion of the series of sessions, the participants did not necessarily know how to determine a power function, how to design a fractionally replicated experiment, or the details of Box's method for investigating response surfaces. They were, however, made aware of how statistics could help them in their own problems. In addition, they saw how varied opinions could be as to the proper approach to a given problem, and the kinds of difficulties associated with these approaches.

Appendix I

The "Process Simulator," Figures 1 and 2, consists of various electrical circuits housed in a cabinet approximately 8″ x 10″ x 10″. On the front face of the cabinet are four control knobs for controlling the values assigned the independent variables of the process, and a microammeter that shows the value of the dependent variable (or yield) for each random sample taken from the process. Also on the front face of the cabinet are switches for turning the process on and off, for obtaining random samples, for testing the various quality characteristics of these samples, and for changing the process from one production line, machine, or operator to another. All of the controlling and indicating devices on the front face of the Simulator are those which are normally available to an actual process operator or investigator. On the rear face of the Simulator, and intended for instructor use only, are switches that select various combinations of the controls on the front face. These selected controls then are the only controls that will affect the quality characteristic in question. For example, the instructor can program the Simulator so that one of the observed quality characteristics can be a function of x_1 and x_2 only. Another quality characteristic could be affected by three independent variables. The effects of these independent variables can be made linear or curvilinear as desired. The degree of slope can also

be changed as desired. Other controls on the rear face of the Simulator enable the instructor to change the degree of bias between production lines, machines or operators and control the magnitude of the variation observed in the measurements of the various quality characteristics. This process variation is automatically created by the Simulator and produces a normal distribution around the mean determined by the setting of the various control knobs on the front face.

Appendix II

Problem Assignment

Background:

We have two measurements associated with a canned fuel element,* viz., total bond count† and can-wall thickness. Operating conditions most conducive to producing fuel elements with low bond count (desirable) tend also to produce fuel elements with thin walls (undesirable). In locating "optimum" operating conditions, some combination of these two measurements will be needed. Let us define a quality index as follows:

Quality Index (Q. I.) = (3 R − 2 T), where R is the can-wall thickness as read on the scale and T is the total bond count reading.

Problem:

Locate conditions (A, B, C, D) which maximizes Q. I.

Assumption:

(3 R − 2 T) is normally distributed with a standard deviation of 8.4 units.

That is, any observed Q. I. is only good to roughly ± 17 units with 95 percent certainty, or the true value at any given set of conditions lies in the interval: observed ± 17. If any interactions are important, they are probably those involving A.

Rules:

You are presently operating at A = 0, B = 8, C = 30, D = 18, which has been giving fuel elements having quality indices of about 15 units. You feel that it is possible to produce a fuel element having an index at least twice as large. Each sample cost $50. For every unit you miss the maximum, it costs you $300. Teams will be judged on total cost basis (or, equivalently, total amount gained).

*Bare uranium fuel elements received at HAPO are "canned" in aluminum jackets prior to charging in the reactor.

†A measure of porosity in the braze layer.

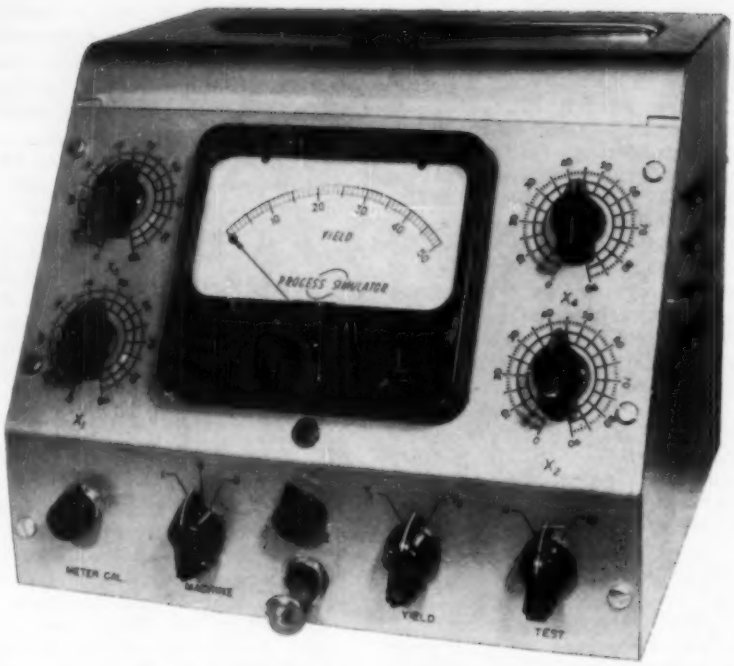

Figure 1—Front face of Simulator showing process controls that are available for the trainees use. Random samples, in the form of small steel bearings, may be obtained from the process. Simulated measurements on the quality characteristics of these bearings are read on the microammeter. The normal variation of these measurements is created automatically by the Simulator.

Figure 2—Rear face of Simulator showing the controls, for Instructor use only, used to create different process situations or pose different statistical problems. A valuable feature here is the ability to turn off the variation observed in the dependent variables and thus show true process situation.

Mathematical Competency + Scientific Knowledge

Training for Statisticians

Industry's Need

TRUMAN L. KOEHLER

Organic Chemicals Division American Cyanamid Company

WE shall here consider briefly the question "What Kind of Statistician Does Industry Need?" It is rather presumptuous for me or anyone to try to answer this question because of the diversity of American industries. I was recently made cognizant of this by some work which I had been doing as a member of the Committee for Education and Training of the ASQC. Within this group is a sub-committee which is attempting to outline a course in experimental design that would be adequate for all industries. A paper-bound text used internally by Texas Instruments and written by Dr. A. W. Wortham and Mr. T. E. Smith has been suggested. I have read the text and can declare it a fine piece of work. However, it would not be at all adequate for people working in experimental design in the chemical industry. The major difference is apparently that most experimentation in the electronics industry is done with qualitative variables, while in the chemical industry we are almost wholly dealing with quantitative variables. For example, I have never used a Latin Square design, much less a Graeco-Latin Square in process development work, since I became associated with the chemical industry.

On further reflection it becomes apparent that there are other peculiarities of various industries which lead to dissimilarities in specific application of statistical methods. But I do not wish to dwell on this point; suffice it to say that if we were to write a specification for a statistician applicable to all industries, about all we could say is that the man ought to be of good moral character. Rather than speak in gross generalities let me confine further remarks to the desires of the chemical and pharmaceutical industries, although in fact they may be slightly more general.

When the industry is chosen, I think there is little to differentiate, in terms of requisite knowledge and ability, between research, development, and process improvement areas. Outside of a few groups, which support basic research in statistics, industry is generally looking for a statistician whose principal function is to bring mathematical and statistical techniques to bear on physical problems with the effect of increasing efficiency in the collection and analysis of data. This kind of job description has been variously called applied statistics or applied mathematics.

From our own experience and from discussions with other people in the chemical industry, there appear to be two areas in which the master's level statisticians will need additional training.

(1) There must be an increase in the level of mathematical competency.

(2) There will be an increasing demand for statisticians with more intimate knowledge of the field with which they are associated.

More Mathematical Competency

Consider first the question of increased mathematical compentency. It seems to me that the growth of applied statistics, to be healthy in any plant, company or industry, must have a two-dimensional aspect. We have all stressed the importance of spreading the knowledge of quality control and statistical methods to as many people as possible. The widespread application of control chart and sampling plan techniques has paid demonstrated savings. There is

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every reason to believe that further expansion will continue to be profitable.

However, I wonder if growth toward increasingly efficient methods of collection and analysis of data, won't be equally or more profitable. Evidence at hand seems to indicate that this is, as a matter of fact, the case. It is also apparent that, as we increase the power of our statistical methods, proper application of these methods requires increased understanding of mathematical concepts.

Let me give an example. For the last several years the base on which experimental design has been carried on in the chemical industry has been 2^n factorials, fractions of 2^n factorials, and the augmented multi-level designs of Dr. George E. P. Box. These designs are relatively easy to use. As soon as the chemist parameterizes the experimental problem and selects ranges over which the parameters are to be studied, setting up the designs is simple. The method of analysis based on least squares is also straightforward.

With the advent of electronic computers a new field of experimental work has developed. For years chemists and chemical engineers have recognized the considerable increase in utility of theoretically based models over simple, general polynomial models. These models, however, usually have the characteristic of being nonlinear in the desired parameters. Two problems have of course developed.

First of all, the problem of fitting these models to given experimental data, while conceptually not difficult, has in practice been found to be very difficult. Secondly, it becomes apparent, after a little thought, that the problem of design is immensely more difficult. This is true because of the tremendous dependency of the efficiency of a design in estimating parameters on the specific reaction being studied. It appears at the moment that there is no hope of ever generating a cook book of designs for nonlinear models in the fashion of the Brownlee book, for example.

All this means that a man, who ten years ago might have been regarded as a capable, applied statistician, must now take on an added dimension of mathematical competence. We cannot much longer rely on a few highly trained experts to digest and simplify new and more powerful techniques.

Turning to the Second Requirement, More Scientific Knowledge

Turning to the second requirement, there will be an increasing demand for statisticians with a more intimate knowledge of the field with which they are associated. The question of how much, or even why, knowledge of the subject field must be known by the statistician is indeed a sticky one. I have read that the reason a statistician must be aware of the field in which he is working is to enable him to explain the inability of his model to fit the data. I think this suffers from the same affliction of many definitions. The denotation is correct, but the connotation is incomplete.

Again let me give an example. Recently a statistician with Cyanamid's production analysis section in New York, Jacob Horowitz by name, was faced with the problem of estimating the variance in the measurement of three feed streams to a reactor in a production process. Repeated measurements were available and the job seemed relatively simple. Fortunately this problem was part of a larger project on which Mr. Horowitz had been working for some time, and further, Mr. Horowitz is a statistician with considerable experience in the chemical industry. He recognized that the feed streams represented one half of a material balance on the process and that measurements with essentially no error were available on the output stream. In a very ingenious paper with some important implications, which incidentally will be appearing in Technometrics, Mr. Horowitz demonstrated that the material balance information could be used to reduce the variance of the estimates of the feed stream measurements. The problem is analogous to measuring the angles of a triangle and improving the estimates by incorporating the information that the sum of the angles must be 180°.

It is fortunate that Mr. Horowitz recognized that material balance information has an effect on the estimation problem. Would the average *chemist* or *chemical engineer*, untrained in statistical methods, be responsible for recognizing the relationship? Hardly! Likewise, from personal observation of the problem, I would guess that the average statistician who did not have a recent undergraduate degree in chemical engineering would likely not have seen that a material balance was possible either.

It does not seem entirely reasonable to require all master's candidates to have an undergraduate degree in one of the physical sciences. However, for a number of years we have recognized a field of applied statistics known as biostatistics. It would seem that similar fields of chemistatistics or electrostatistics could be developed. I'm sure American Cyanamid will have a job for the first chemistatistician trained at any university.

Summary

In summary, let me review briefly. As a basic premise, we all recognize that there is an advantage to industry in broadening the application of present statistical methods and in adopting new and more powerful techniques. In the past there has been a tendency to wait for an expert who possessed above average mathematical ability and training, to digest and simplify the techniques. Now it appears that in several fields, digestion and simplification in terms of the requisite mathematics are impossible. As a result, adoption of the newer techniques requires that the average applied statistician become a better mathematician. In addition, there are areas in which *explicit* incorporation of existent scientific knowledge will improve estimation procedures, especially, for example, in connection with the newer techniques. A vague knowledge of the physical science field will not be adequate for the statistician.

It is interesting to note that the Chemical Engineering Department of Princeton University makes available to its graduate and undergraduate students a fine program in mathematics and statistics. Similar programs are likely to be available to students in other scientific disciplines. Our colleagues in the physical and engineering sciences are beginning to recognize the importance of establishing the link between mathematics, statistics, and the sciences, and have begun to alter their programs accordingly. The time appears to be now when careful thought should be given to alteration of our statistical curricula to emphasize the same link, mathematics, statistics, and the sciences, for the statistician.

The Role of Quality Control

As Moderator of Applied Science

In the Corporation

LESLIE E. SIMON

The Carborundum Co., Niagara Falls, N.Y.

Definitions

The title of this article contains four broad terms which, like Humpty Dumpty's words, are generally used to mean what the speaker intends for them to mean. These terms are: *applied science, moderator, quality control,* and *corporation.* We should define these terms at the outset in order to have a frame of reference for discussing the powerful leverage position of modern applied statistics in its operation relative to the economy of a business enterprise; and, in turn, the powerful leverage position of quality control in its relation to applied science. I promise that none of the definitions will be radical, but I know of no single entity, other than The Carborundum Company, where all four are used in the homogeneous context that I propose.

Applied Science

By the term applied science, I mean to imply a dichotomous division of all science into basic research and applied research. Thus we have on one hand basic science, which is almost science for science's sake, the not apparently remunerative, relatively pure, but highly important non-object directed inquiry into fundamental phenomena; and, on the other hand, the whole continuum of applied science which embraces all materially useful applications of science and engineering, including engineering research (or technical research), development, production engineering, pilot-plant operation, plant engineering and even the engineering aspects of repair and maintenance of a manufacturing plant.

Applied science may be termed technology. This is precisely the sense in which Bronk, Oppenheimer and Wiesmer used the latter two terms in their television panel, "The Great Challenge," on February 22, 1959. Whereas this is mere definition, it is also the genesis of a concept analogous to a unified field theory, by which we may efficiently integrate technology into the corporate structure as a whole spectrum at some expense to the value and status that is currently allocated to research and development. It is true that research and development will remain dominant in the integrated structure of technology, perhaps as the brilliant red of the spectrum, but it will be preceded on the left by darker basic research, and succeeded on the right by production-engineering orange, pilot-line yellow, manufacturing green, and market development violet.

There is nothing really new in this concept: the matter of interest inheres in the fact that it does not appear to have been very much used. We in research and developmnt might account for its lack of use on the grounds that the 1930's and 1940's witnessed such a struggle to get research and development out from under the dominance of engineering that we have not gotten around to viewing our work in applied science in broad perspective. Perhaps a working application of the board concept of technology as a continuum of applied science woulld still be impracticable, if we were not conditioning gradually and stepwise by observing the beneficial effects of the orderly cooperation of men of various specialties, in hospitals, in technical meetings and symposia, and in research. The extension of the synergistic effect of a mingling of diverse disciplines under orderly monitorship to all technology makes possible the more efficient use of technical personnel, a more rewarding life for the technical man, reduced time lag in the evolution of new things, and more things of benefit to mankind.

Moderator

If we accept the broad perspective of applied science as a continuum of technology, we have, in a sense, made our task as scientists and engineers more difficult. Much has been published on the time-lag between research and development; the transition from development to production is notoriously fraught with dissentions; and adding the additional territory of all other engineering and applied science to a single managerial entity would amplify noise and confusion unless we introduce a coordinating agency, a nerve center, a monitor, in short, a moderator.

At about the turn of the century, the evolution of new things lost its simplicity of the zero order with the virtual demise of the ofttimes envied and equally ofttimes vilified lone inventor. The concept of group

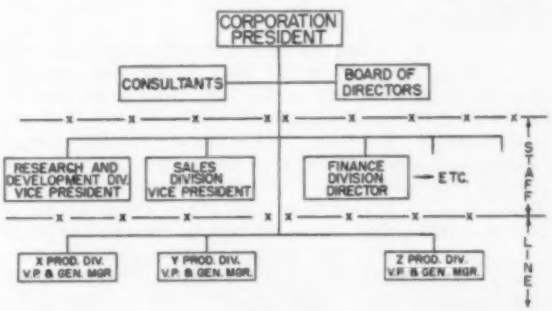

Figure 1

enterprise in research and development was a great stimulus to fruitfulness, even though the group inventors were all of the same discipline. The World War II birth of Operations Research brought into sharp focus the efficacy of diversifying the team through a "mingling of the disciplines." In practice, Operations Research brought out the fact that the member or members of the applied science team who represented the discipline of mathematics generally emerged as the directing agency of the joint

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Presented by Leslie E. Simon, Maj. Gen., U.S.A., vice president of the Carborundum Co., as an invited paper at the dinner given in honor of the graduating students of the Master's Degree Course in Applied and Mathematical Statistics, May 16, 1959, at Rutgers · The State University, New Brunswick, N.J.

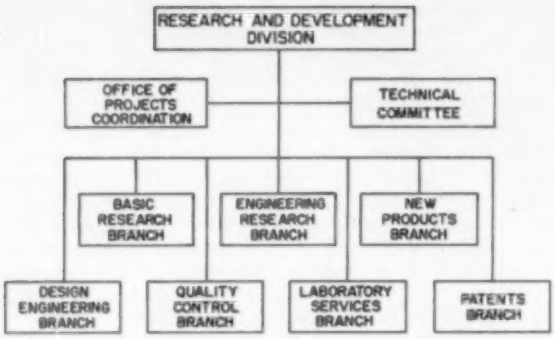

Figure 2

efforts, irrespective of whether a boss, project leader, or chief investigator was formally designated. Perhaps this is not surprising, if we remember the words of the famous Harvard philosopher, C. I. Lewis, "Of all human endeavors, mathematics admits most of certitude and precision."

In practical work, and technology is practical work, that somewhat humbler branch of mathematics, applied statistics, is represented in almost every well-planned group enterprise, whether or not the person who exercises the statistical functions professes to be a statistician. Thus, the statistician, either through merit or *faute de mieux* automatically appears to become the agency for reducing what would be chaos to orderly simplicity. He often detects the necessity for the enterprise; he prompts the planning; he designs the experiment; he separates the spurious from the real, the noise from the signal, the strong parameters from the weak; his logic leads to proper task assignments to components of the team; and he analyzes the data and presents the results. In short, he is the moderator.

Unquestionably, not all statisticians are individually qualified for the task of moderator. Many statisticians have the engineering ability and the leadership to do it; but sometimes a strong leader of another discipline must assume the dominant role as moderator, with statistical support from one or more statisticians.

Quality Control

In the light of the above paragraph, one may well ask why I used quality control in the title of this article. It is true that industrial statistical quality control performs functions for manufacture that are analogous to those described above for the statistician; so I choose to use the term quality control in lieu of applied statistics throughout, both because it appears to fit better than any other available term, and for the quite material reason that it is much more palatable to the corporation. Quality control has a practical, down-to-earth connotation; whereas the names of other branches of statistics may sound esoteric to top management, and to the humbler engineers, to say nothing of people in manufacturing and sales. If one wishes to change the *status de facto* to the *status quo ante*, why make the task more difficult than necessary?

Corporation

By corporation, I do not mean to limit the scope of the term to a legally incorporated enterprise. The term corporation, as used here, may be applicable to a company that does not bear the familiar "Inc." in its title, to a reasonably large subdivision of a large corporation, or even, in some instances, to a non-manufacturing enterprise. As in the choice of quality control relative to statistics, corporation is chosen merely as the best fitting of available terms. Furthermore, for the sake of ease of presentation, I shall address myself to the medium-sized corporation with central executive and staff groups and with decentralized manufacturing divisions. By choosing such a framework for discussion, one may readily translate applicable portions of the discourse to more complex or to more restricted enterprises.

Structure of the Corporation

In discussing the role of quality control in the corporation, I shall not endeavor to present business, economic, or technical reasons for the corporate structure that, in this instance, is serving merely as a vehicle for discourse. Nevertheless, some of the reasons for the choice will incidentally become evident in discussing quality control.

In general, the headquarters of the corporation contains staff divisions that prescribe policy, perform functions that are common to several line divisions and functions that can be performed more economically in the central organization, and give leadership to the corporation. The line divisions, on the other hand, are the "doers", they are "profit centers." Generally, each has a rather high degree of autonomy and manufactures and sells a line of products. (See Fig. 1.)

In many corporations, the research and development division (which may or may not include engineering) has both a line and a staff function. The vice president for research not only exercises staff supervision of all research and development matters wherever they may occur throughout the corporation, but also has the line direction of the central laboratory of the corporation. In this type of organization, the central laboratory does not only things which it is more economical to do centrally, but also is responsible for the whole of the effort leading to entirely new product lines. (See Fig. 2.)

Each decentralized manufacturing division of the corporation is charged with keeping its product line equal to or better than competitive products both with respect to quality and cost and with initiating new products that are along its assigned product line. The main agency for executing this responsibility is a combined development and engineering branch,

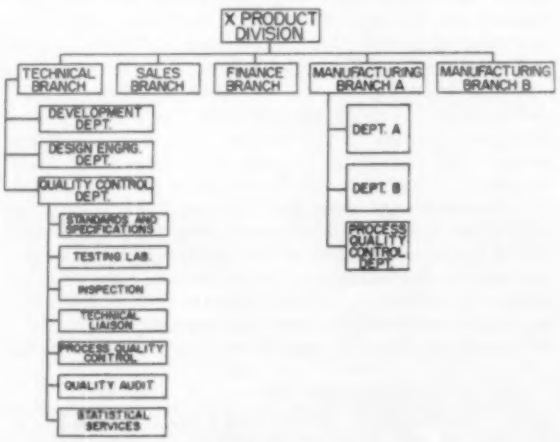

Figure 3

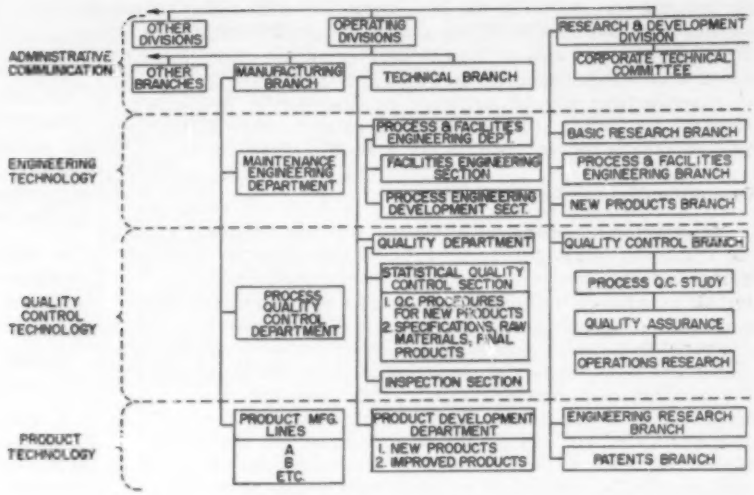

Figure 4—Flow of Technology in a Multi-Division Corporation

called the technical branch. The place of this branch in the manufacturing division is shown in Figure 3.

The Organization for Quality Control

It is seen from Figs. 2 and 3 that quality control exists at three levels in the corporation (1) in the central laboratory level where the most advanced types of work are done, such as operations research, complex design of experiment, and corporationwide assessment of level of product quality; (2) in the technical branch level where there is the statistical staff function for the manufacturing division that is merely a small-scale model of the statistical function that the central laboratory does for the whole corporation; and (3) in the manufacturing branch level where the quality of manufactured product in the process of production is controlled in the Shewhart sense.

Thus, there is a clear channel of technical communication from persons concerned primarily with simple process control techniques, such as control charts for $\bar{X}$ and R, all the way up to persons concerned with the most advanced statistical techniques including the programming of their work on electronic digital computers. No man need fear getting beyond his depth, for he can always get help from the next higher echelon. This is a lateral flow of technology between persons of like disciplines; and applies not only to quality control, but to all required disciplines. (See Fig. 4.)

Similarly, there is a vertical flow of communication between quality control and the other disciplines of the same organizational echelon; e.g., between quality control branch of the central laboratory and the other branches of the laboratory; between the quality control department of a technical branch and its other departments. It is primarily the consequences of the vertical flow of communication that result in quality control's function as moderator of applied science, although the enunciation of the problem that requires the task group approach may be a complex interaction of vertical and lateral communication.

Why Q.C. Is the Moderator

Certainly the key position of moderator should not fall to quality control as a matter of divine right. It would, indeed, be difficult to so place it as a matter of fiat. First, confidence must be engendered and competence proved by good work done on an informal basis. Second, for really efficient functioning, it is almost a prerequisite that there be a scientific organization of men of various skills and disciplines that makes them readily available to work together as teams on which each can function in his highest technical capacity to get the assigned task done. Once these conditions are achieved, however, the duties and functions that are logically assigned to quality control make it *ipso facto* the moderator more frequently than any other discipline. To illustrate these conditions I shall quote directly excerpts from the written instructions of The Carborundum Company that pertain to quality control.

Product Quality Control

The phrase "product quality control" covers all activities necessary to achieve a quality of company products that is competitive and optimally profitable. These necessary activities embrace not only the development of the product in the first instance but all subsequent processing, storage and distribution aspects insofar as these phases in the evolution and distribution of a product affect the technical performance characteristics intrinsic in design. It applies particularly to the validation of the performance characteristics by statistically acceptable methodology.

Quality Control Organization

One essential for good product quality control is that it be organized properly. Necessarily, many organizational units are involved in this activity. There must be a concise statement and a clear understanding of the responsibility of each organizational unit with respect to the role it plays in the several sequential phases of quality control. The determination of what is proper quality and the establishment of tolerance limits on the acceptable variability must be distinguished clearly from the actual achievement of that quality level in production. The former is a setting of standards, and is exercised by the division manager through his technical branch. The latter cannot be separated from

the general responsibility for manufacture and should include detailed control in the process of production. This distinction follows the sound principle that whoever is responsible for achieving proper quality in manufacture should not also be responsible for determining what constitutes the proper quality against which the achieved level will be judged.

Operating Division Responsibilities

Manufacturing operating divisions are responsible for the formulation and application of adequate specifications for finished goods offered for sale, materials purchased including components and supplies and semi-finished goods manufactured. In intra-Carborundum sales, where the finished product of one division is the raw material of another division, the product and process specifications are the responsibility of the supplying division. It is the responsibility of the using division to furnish the supplying division with the desired characteristics of such materials, subject to requirements under manufacturing branch responsibilities.

Products are, insofar as practicable, described completely and solely by product specifications which within practical limits scientifically and objectively express physical, chemical or electrical and performance properties in quantitative terms with standard methods of measurement.

Products, except experimental and developmental, are specified with no higher quality, rigidity nor restrictiveness than necessary for the market.

Specifications are reduced to writing and supplied to all concerned. They must be followed for other than experimental or developmental production until modified in writing. This is the most important single requirement of a proper quality control system. There can be no excuse for its non-observance.

When a product specification for a material used substantially intra-Carborundum as a semi-finished material is dependent upon a process, the manufacturing division does not finalize a process change until sufficiently large samples of the resulting product have been found satisfactory to the using division.

Using divisions have the responsibility of testing under all applicable conditions the various intra-Carborundum products, including experimental and developmental products, and determining their acceptability for use in the various end products. (See section entitled Manufacturing Branch Responsibilities.)

The operating divisions have the responsibility of conducting their appropriate part of joint projects to determine the relationship of the properties of intermediate products, such as the properties of grains and crudes best suited to their end use. Normally such joint projects will be under the supervision of the research and development division.

Operating Division Organization

Within a manufacturing operating division there are three branches with substantial responsibilities in the respective phases of product quality control.

The technical branch has the responsibility of determining what constitutes proper quality of finished goods offered for sale, materials purchased including components and supplies, and ascertaining through a quality audit that it has been maintained. This includes.

1. Determining what quality characteristics a product should have and the extent to which it should have them. This includes responsibility for coordination among technical, manufacturing and sales branches to ensure the proper employment of the respective products in the environments of their commercial use.

2. Determining the adequacy of design of products to meet the quality characteristics, together with related performance characteristics, that may pertain thereto.

3. Determining, preparing, and issuing product specifications.

4. Determining, preparing, and issuing process specifications, standard inspection procedures and amplifying documents, such as description of manufacture. Under the principles of paragraph two, above, it is essential that this responsibility be placed in the technical branch, because in many instances proper quality cannot be defined solely by product specifications.

5. Determining, preparing, and issuing the methods to be used to check and control product quality including laboratory analysis, testing and inspection. Laboratory and testing equipment which is not directly included as a control device in the manufacturing process but used for other purposes, such as quality audit, is under the control of the technical branch until it can be sufficiently simplified and satisfactorily applied in a production environment. Analyses and tests performed by the technical branch may be for quality audit, or they may be mere service work performed for the manufacturing branch, in which the results of tests are submitted to the manufacturing branch for such action as it deems appropriate. If automatic testing or inspection is an essential adjunct to the flow of production, the equipment required for such purpose should be an integral part of the manufacturing process.

6. Periodic auditing of the application of product and process specifications and of testing and inspection methods within the manufacturing branch.

7. Establishing and monitoring the use of a system for gage control and for routine calibration of control, test and inspection instrumentation and equipment to keep it accurate and performing properly.

The manufacturing branch has the responsibility of manufacturing products of the quality delineated by the product and process specifications and of exercising economic quality control of the manufacturing process in accordance with the methods issued by the technical branch. It can and should make recommendations for changes in such procedures to either lower costs or improve quality, but it cannot unilaterally change or modify such procedures or substitute for them. The manufacturing branch:

1. Is responsible for elimination of losses.

2. Has control over all equipment, inspectors,

CORPORATE ECHELONS	R & D DIVISION	OPERATING DIVISION	
QUALITY CONTROL ECHELONS	QUALITY CONTROL BRANCH	TECHNICAL BRANCH QUALITY CONTROL DEPARTMENT	MANUFACTURING BRANCH PROCESS QUALITY CONTROL DEPARTMENT
QUALITY CONTROL FUNCTIONS	QUALITY AUDIT. 1 AIDS FOR DECISION-MAKING. 1, 2 ASSISTANCE TO OPERATING DIVISIONS. 3 INSTRUCTIONS IN QUALITY CONTROL METHODS. 3 CENTRAL AGENCY FOR SPECIFICATIONS. 3 APPROVAL OF INTER-DIVISIONAL SPECIFICATIONS. 3 Numbers refer to echelons served	ADEQUACY OF DESIGN. 4 PROCESS AND INSTRUMENTATION. 4, 5 PROCESS AND RAW MATERIAL SPECIFICATIONS. 2 TEST AND INSPECTION STANDARDS. 2 PRODUCT EVALUATION. 3, 4 QUALITY AUDIT. 1 GAUGE CONTROL. 2 STATISTICAL SERVICES. 1, 2, 3, 4 SURVEILLANCE OF DIVISIONAL ACTIVITIES. 2, 3, 4, 5	PROCESS CAPABILITY STUDIES. 1 STATISTICAL QUALITY CONTROL TECHNIQUES. 1 APPLICATION OF IN-PROCESS SPECIFICATIONS AND QUALITY CONTROL PROCEDURES. 1 TESTS MACHINE PERFORMANCE. 1 ADVICE ON REMEDIAL PROCESS CONTROL ACTIONS. 1
ECHELONS SERVED	1. PRESIDENT 2. BOARD OF DIRECTORS 3. TECHNICAL BRANCHES	1. DIVISION MANAGER 2. MANUFACTURING BRANCH 3. SALES BRANCH 4. DEVELOPMENT DEPT. 5. DESIGN ENGINEERING DEPT.	1. MANUFACTURING BRANCH

Figure 5—Interactions of Quality Control in the Corporation

and others engaged in any way in quality control during the process of production in the manufacturing plant.

3. Is responsible for the carrying out of statistical and other quality control procedures, including use of statistical techniques in sampling, maintaining process capabilities, controlling precision and accuracy of testing, and applying statistical process control, as prescribed by the technical branch.

4. Is responsible for interrupting production if product quality is unsatisfactory, until remedial action is taken. This may be necessary because of the requirement of section entitled operating division responsibilities. In such cases remedial action is a responsibility of the technical branch, and it must also bear the onus for the interruption of production.

5. Is responsible for action, or obtaining action, to remedy the process when off-quality is indicated.

The sales branch is responsible for continuous supply of valid information from the field to the technical and manufacturing branches with respect to:

1. The apparent quality of competitors' products.

2. The needs of customers with respect to new and improved products and product quality and application.

3. The apparent quality or reputation of the company products being shipped to the customers. It is also responsible for obtaining the necessary support from the technical branch with respect to cooperative tests run in customers' plants.

Research and Development Division Responsibilities

The research and development division, at the functional staff level, is the counterpart of the technical branches of the operating divisions. As such, it has staff responsibility for product quality control throughout the company, including, but not limited necessarily to:

1. Technical assistance to the technical branches on specifications, processes and methods of control. This includes assistance to technical branches of operating divisions in instrumentation and process automation, particularly with respect to new or improved methods of measurement and control.

2. Performance of laboratory analyses and tests not within the economic capabilities of the technical branches.

3. Periodic audits of the performance of quality control within the operating divisions.

4. Responsibility for approving product and process specifications prepared by producing divisions for products that are substantially used by another operating division. This responsibility extends to refereeing incompatibilities among the respective divisions concerning specifications of one which impinge on the quality characteristics of the products of another division, including the determination and issue of product and process specifications.

5. All quality activities for products assigned to the new products branch of the research and development division.

6. Assisting in the training of quality control personnel in technical and manufacturing branches of operating divisions, imparting to these personnel information on new developments in the field, and enhancing the professional capabilities of all those engaged in product quality control.

The quality control branch of the research and development division will be the central agency and place of record for major product and process specifications. The quality control branch of the research and development division —

1. Receives sufficient copies of major product and process specifications to cover all distributions to be made to subsidiaries and affiliates plus one permanent file copy.

2. Maintains surveillance over all specifications from the point of general company interest, in particular providing the patent branch with an opportunity for review prior to distribution in all instances where there is a pos-

sibility of disclosure of patentable material.

3. Handles specific requests for specifications from outside the consolidated company.

4. Maintains a continuing study for standardization and improvement of specifications. A check is maintained for consistency among specifications for similar products.

5. Ascertains that there is a current, adequate and feasible set of specifications for every company product.

6. Provides a safe repository for major product and process specifications. Particularly important specifications may be microfilmed and stored in safe areas.

Conditions for Use of Q.C.

The quite extensive use of quality control technology described here involves marked changes in the philosophy of industrial technology, in the organization of technical people, and in delegation of authority and responsibilities. These changes, however, are largely a systematic extension to technology of the tried and proven principles that have been worked out by business and business schools for application in other areas.

Procedure

Briefly — and very briefly — one must first analyze the objectives of the industrial echelon (corporation, company, or division), identify the functions that it performs, associate the functions with relevant disciplines or skills; and eventually arrive at the number and kind of professional people needed. Second, one must study how the people should be placed for ready communication and effective interaction, so that each individual can be used in his highest capacity for a maximum of time. Thus, one arrives at conditions for lateral and vertical communication and lateral and vertical support. It should be noted that such a system extends all the way from research to sales.

However, these conditions for speedy and economical operation require a coordinating nerve center and a nerve system. It is but an extension of the well accepted principles worked out for industrial statistical quality control in manufacture to apply appropriate statistical tools to all phases of examination of data, design of experiment, and analysis of results.

Although the foregoing is a true glimpse of the practical world of today, I do not mean to imply that we shall shortly see application on this scope throughout industry. Before World War II there was hardly any statistical quality control; however, the progress of quality control since World War II would indicate that rapid growth in allied statistical fields is to be expected. If we compound this expectancy with related pressures, such as the need to make best use of technical men in order to alleviate the shortage of scientists and engineers, the ever-increasing urge to make better and newer things more quickly, the trend toward more automation, the increasing usefulness and availability of high-speed computers, we shall have to work hard to avoid a shortage of trained statisticians.

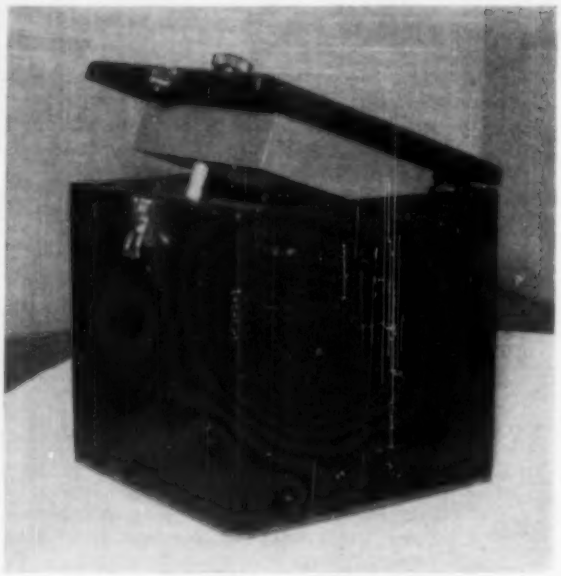

Figure 1—Side View Showing Hidden Compartment

Table I—Sampling Demonstration—20 Samples—N = 100

Percent of beads in box (as a decimal)	Bead Color	Number Beads in Sample A	Number Beads Expected E	A—E	$\frac{(A-E)^2}{E}$
0.002	Natural	2	4	— 2	1.00
0.005	Shocking Pink	9	10	— 1	0.10
0.090	Pink	174	180	— 6	0.20
0.220	Orange	454	440	+16	0.58
0.533	White	1095	1066	+29	0.79
0.115	Red	196	230	—34	5.03
0.028	Blue	56	56	0	0.00
0.004	Green	8	8	0	0.00
0.003	Black	6	6	0	0.00
		2000	2000		$\chi^2 = 7.70$

The Chi-Square sum indicates that the differences between the actual values and expected values could easily be attributed to chance.

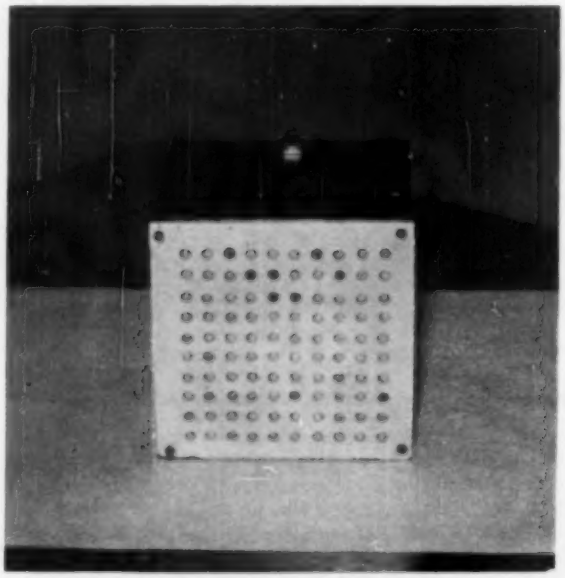

Figure 2—Face View Showing Light and Dark Beads

Acceptance Sampling Demonstration With A Bead Box

FRANK CULLEN, *The National Plastic Products Co., Odenton, Md.*

STANLEY KALIN, *Bendix Radio Division, The Bendix Corp., Towson, Md.*

The operation of a control chart for percent defective is often demonstrated by preparing a bowl of colored beads, white to represent good pieces and red to represent defects, and a paddle to use in drawing a sample of beads from the bowl.

There are several difficulties which often arise in making this type of demonstration:

1. It is difficult to assure a good mix throughout the demonstration.

2. Beads often fall from the paddle and the resulting confusion in restoring the beads to the paddle or bowl is distracting to the audience.

3. It is often difficult to show the sample results to the audience.

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To overcome these difficulties a sampling box was built of wood, with a hinged cover and one side containing a hundred holes covered with plexiglass. The holes were drilled at an angle to the perpendicular (see drawing) so that the beads would not easily be dislodged.

A compartment was attached to the hinged cover and so constructed that the number of defective beads could be changed during the demonstration to illustrate the power of the control chart to pick up a change in the process average.

To operate the box turn the plexiglass side up to empty the holes. Then give the box a thorough shaking, turn plexiglass side down and a sample of beads will fill the one hundred holes.

The box should be tested for bias by running a "p" chart[1] with about 50 readings, or if many colored beads are used, a Chi-Square Test for goodness of fit[2] may be made, as shown in Table I.

Note that the box could have been constructed with several sides to demonstrate control charts based on various sized samples.

The authors have used this "Bead Box" demonstrator successfully many times in the plant and in the classroom.

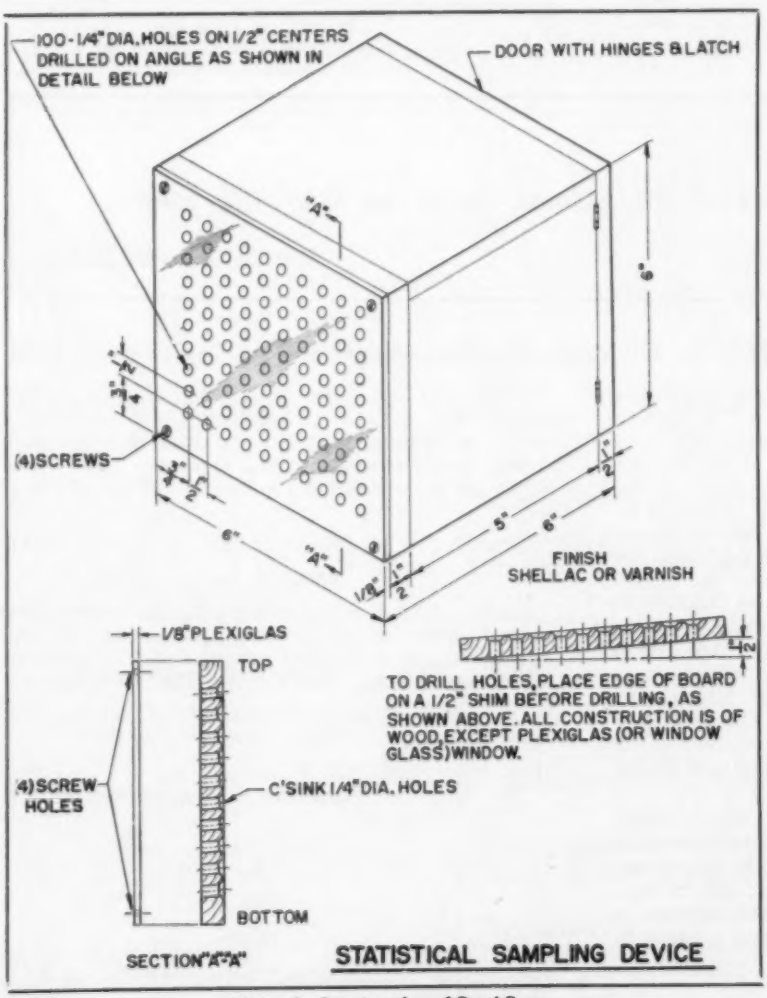
100-1/4" DIA. HOLES ON 1/2" CENTERS DRILLED ON ANGLE AS SHOWN IN DETAIL BELOW
DOOR WITH HINGES & LATCH
(4) SCREWS
FINISH SHELLAC OR VARNISH
1/8" PLEXIGLAS
TOP
TO DRILL HOLES, PLACE EDGE OF BOARD ON A 1/2" SHIM BEFORE DRILLING, AS SHOWN ABOVE. ALL CONSTRUCTION IS OF WOOD, EXCEPT PLEXIGLAS (OR WINDOW GLASS) WINDOW.
(4) SCREW HOLES
C'SINK 1/4" DIA. HOLES
BOTTOM
SECTION "A"-"A"
STATISTICAL SAMPLING DEVICE

Figure 3—Construction of Bead Box

References

(1) E. I. Grant, *Statistical Quality Control*, Second Edition, McGraw-Hill Book Co., pp. 229-236

(2) A. J. Duncan, *Quality Control and Industrial Statistics*, Richard D. Irwin, Inc., pp. 412-415

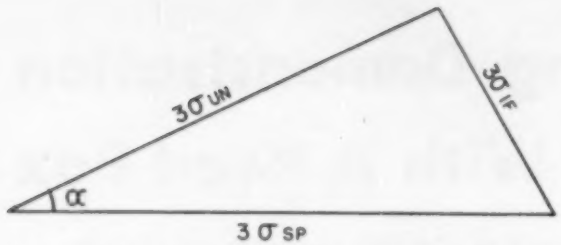

Figure 1—The Ten Percent Critical Value of the Contribution Effect of $3\sigma_{if}$ ($\sigma_{un} = 0.9\sigma_{sp}$)

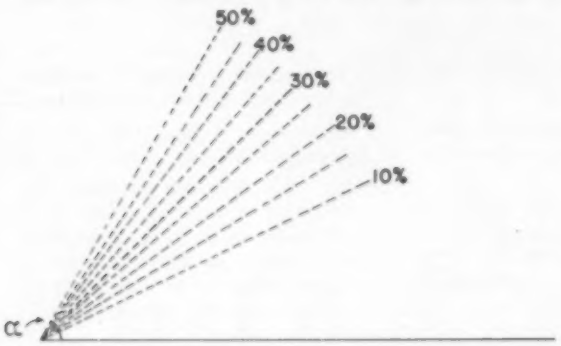

Figure 2—Suggested Form for α Lines Preprinted on Transparent Plastic

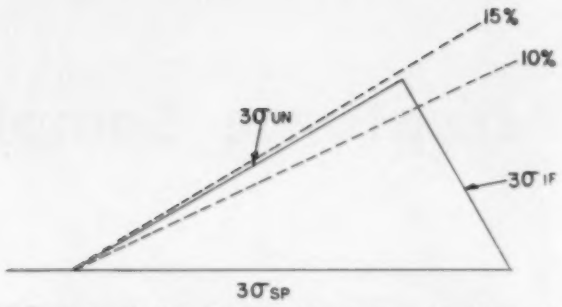

Figure 3—Graphic Method for Determining the Percent Contribution of $3\sigma_{if}$ to $3\sigma_{sp}$

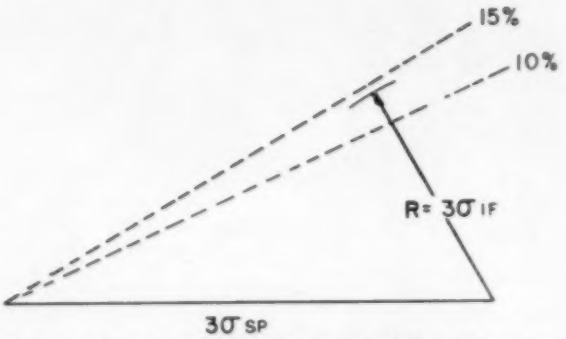

Figure 4—Alternate Graphical Method for Determining the $3\sigma_{if}$ Contribution

A Graphical Method For

Determining the Effect of the Isolated Factor on the Total Span

In the Span Plan Analysis

JAMES R. GILMAN, *Bay State Abrasive Products Co., Westboro, Mass.*

In the Span Plan Method of Process Capability Analysis developed by L. A. Seder and D. Cowan (*ASQC General Publication No. 3*) one of the most important steps is the determination of the percent contribution of the Isolated Factor ($3\sigma_{if}$) to the Total Span ($3\sigma_{sp}$). This information is obtained by a series of arithmetical computations which culminate in Test No. 3 of the analysis. In this step, the difference between the Total Span and the Unresolved Factor ($3\sigma_{un}$) is divided by the Total Span and the resultant fraction, expressed as percent, is the "contribution" effect of $3\sigma_{if}$ to $3\sigma_{sp}$. This article describes a graphical procedure which may be substituted for the computation of Test No. 3 for establishing the contribution effect of $3\sigma_{if}$. The procedure described involves a revision in the pictogram of the Span Plan, making it a more meaningful part of the analytical process.

In applying the Span Plan, a contribution effect of ten percent by $3\sigma_{if}$ is considered the critical value in evaluating the significance of this factor. If the $3\sigma_{if}$ contribution is greater than ten percent of $3\sigma_{sp}$, $3\sigma_{if}$ is considered significant and worth trying to reduce. If $3\sigma_{if}$ contributes less than ten percent to $3\sigma_{sp}$, it is considered unimportant.

ASQC LCS Code 320:00:400

For $3\sigma_{if}$ to contribute exactly ten percent to $3\sigma_{sp}$ implies that, if $3\sigma_{if}$ were completely eliminated, $3\sigma_{sp}$ would be reduced to 0.9 of its original value and would then be equal to $3\sigma_{un}$ (i.e., the Total Span would consist entirely of the Unresolved Variability) or:

$$0.9(3\sigma_{sp}) = 3\sigma_{un} \qquad (1)$$

$$0.9\sigma_{sp} = \sigma_{un}$$

Study of Fig. 1, a pictogram with the ten percent critical value of the contribution effect of $3\sigma_{if}$ ($\sigma_{un} = 0.9\sigma_{sp}$), shows that a fixed angle, α, is established between $3\sigma_{sp}$ and $3\sigma_{un}$ for this condition.

The value of α is determined by solving the equation:

$$\cos\alpha = \frac{3\sigma_{un}}{3\sigma_{sp}} = \frac{\sigma_{un}}{\sigma_{sp}} \qquad (2)$$

$$= \frac{0.9\sigma_{sp}}{\sigma_{sp}}$$

$$= 0.9$$

$$\alpha = 25.8°$$

If known "contribution" effects of $3\sigma_{if}$ to $3\sigma_{sp}$ other than ten percent were evaluated, we would

have equivalent values of $3\sigma_{un}$ equal to the difference between $3\sigma_{sp}$ and the fractional contribution of $3\sigma_{lf}$ to $3\sigma_{sp}$. Values of α would then be established by these values of $3\sigma_{un}$ in accordance with the following general equations:

$$3\sigma_{un} = \frac{X(3\sigma_{sp})}{100} \qquad (3)$$

$$\sigma_{un} = \frac{X\sigma_{sp}}{100}$$

where X equals percent of $3\sigma_{sp}$ remaining if a known "contribution" effect of $3\sigma_{lf}$ were removed (i.e., the percent contribution of $3\sigma_{un}$ to $3\sigma_{sp}$).

Substituting in Equation 2

$$\cos \alpha = \frac{X\sigma_{sp}}{100\sigma_{sp}} \qquad (4)$$

$$= \frac{X}{100}$$

$$\alpha = \cos^{-1} \frac{X}{100} \qquad (5)$$

Using preassigned values for the contribution of $3\sigma_{lf}$, Table I for equivalent values of α is computed.

By predrawing lines for α on the Span Plan pictogram and marking them according to their corresponding contributions of $3\sigma_{lf}$ to $3\sigma_{sp}$, we will be able to determine visually the percent contribution of $3\sigma_{lf}$ to $3\sigma_{sp}$. If it is undesirable to predraw the α lines due to the difficulty of accurately placing the center of the pictogram in advance, the α lines can be preprinted on transparent plastic which can then be overlaid on the pictogram for determining the percent contribution of $3\sigma_{lf}$ to $3\sigma_{sp}$, as in Fig. 2.

Table I—Equivalent Values of α

% Contribution of $3\sigma_{lf}$ to $3\sigma_{sp}$	% Contribution of $3\sigma_{un}$ to $3\sigma_{sp}$	α
10	90	25.8
15	85	31.7
20	80	36.8
25	75	41.4
30	70	45.6
35	65	49.4
40	60	53.1
45	55	56.6
50	50	60.0

When the pictogram is drawn for any analysis, the percent contribution of σ_{lf} to σ_{sp} can be determined by observing the angle of the $3\sigma_{un}$ line relative to the α lines. The closest α line enclosed within the angle formed by the $3\sigma_{un}$ - $3\sigma_{sp}$ lines will represent the percent contribution of $3\sigma_{lf}$ to $3\sigma_{sp}$ of the analysis being made.

In Fig. 3, the $3\sigma_{un}$ line falls between the α lines for ten percent and 15 percent. This means that the contribution of $3\sigma_{lf}$ is at least ten percent but not as much as 15 percent of the total spread represented by $3\sigma_{sp}$. If we had α lines for 11, 12, 13 and 14 percent contribution effects which we could easily obtain from Equation (5), we could estimate the $3\sigma_{lf}$ effect even more closely.

As a further simplification of the proposed graphical method, it is actually unnecessary to draw in the lines for $3\sigma_{lf}$ and $3\sigma_{un}$. By observing the location of the arc which is drawn to represent the value of $3\sigma_{lf}$, we can determine its contribution effect by visual interpolation between the α lines. In Fig. 3, it can be seen that the actual line for $3\sigma_{un}$ is unnecessary since this line is merely the tangent to the arc representing the value of $3\sigma_{lf}$. Also, it is unnecessary to draw in the $3\sigma_{lf}$ line since, without a line for $3\sigma_{un}$, no triangle is formed for the pictogram. A distilled, but perfectly usable, version of Fig. 3 is shown in Fig. 4.

For purposes of further illustration, let us examine a typical Span Plan analysis of a machine which is producing a certain mechanical part for which the dimensional tolerance is 0.258" ± 0.005". The part measurements are coded in the following analysis in units of 0.001" over 0.250" (see Fig. 5).

By observing the relative position of the arc representing the time-to-time (isolated factor) variation, we note that it falls below the ten-percent contribution effect line. This, therefore, means that the time-to-time variation is not significant and that it is necessary to work on the within-time variation—i.e., improve the process capability—if the machine is to be able to meet the tolerances.

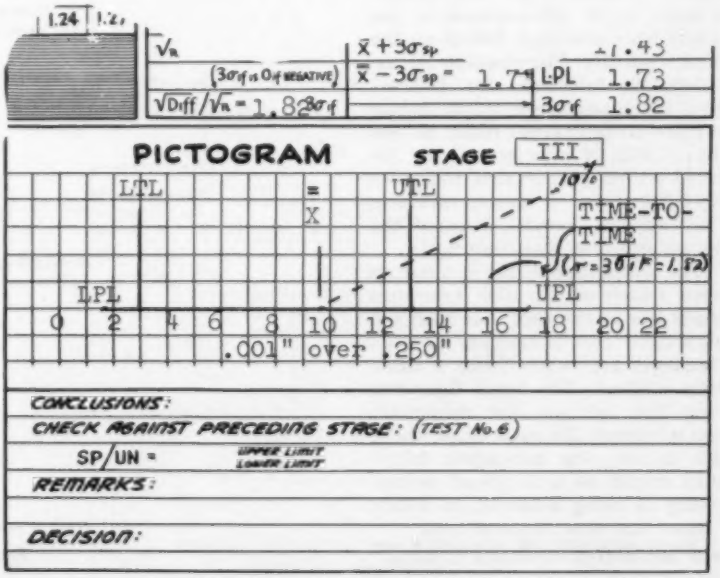

Figure 5—Pictogram Section of SPAN Plan Data Sheet Showing the Graphical Method of Obtaining $3\sigma_{lf}$ Contribution

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Geometric and Positional Tolerancing

PART II

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Plumbing Fittings Section of American Radiator and Standard Sanitary Corp.

Symbols and Tolerances

Because the terms geometric tolerance, datum, and tolerance zone are used repeatedly throughout this article, the following points regarding them cannot be overemphasized.

Geometric tolerances are specified for critical machined surfaces only. The geometric characteristics of fabricated stock items, such as bars, sheets, tubes, are controlled by industry standards and are considered acceptable if a form tolerance is not specified.

When a geometric tolerance is specified for a surface, it applies to the entire surface, regardless of the size of the feature. If only a portion of the surface is critical, it is incumbent upon the design engineer and the draftsman to specify explicitly the critical area by length or diameter.

A geometric tolerance is a total tolerance, not a plus or minus value. It is the total maximum indicator reading.

Total surface irregularities, particularly surface roughness and waviness, of a surface selected as a datum must be less than the geometric tolerance of the feature related to it. Measurements are taken from the high points on the datum surface. For example, if the geometric tolerance for flatness on a given surface is 0.002, datum surface irregularities must be less than 0.002. If a hole is to be located within a geometric tolerance of 0.010 from a datum surface, total surface irregularities of the datum must be less than 0.010.

The advantage of using a datum from which to establish tolerance zones lies in the fact that both the maximum and minimum size dimensions are taken from a common surface. The total tolerance zone lies between the maximum and minimum dimensions. Without the datum, the geometric tolerance might be interpreted erroneously as being bilateral, in which case the tolerance would be doubled. For example, if the size tolerance is 0.010, the tolerance could be split, or bilateral, to allow 0.005 in each direction. If the geometric tolerance is 0.002, it might be assumed that 0.002 could apply in each direction, thus making the

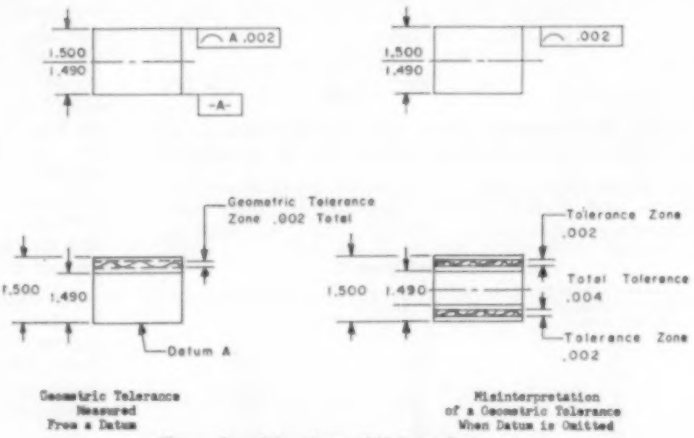


Figure 8 — Advantage of Using a Datum

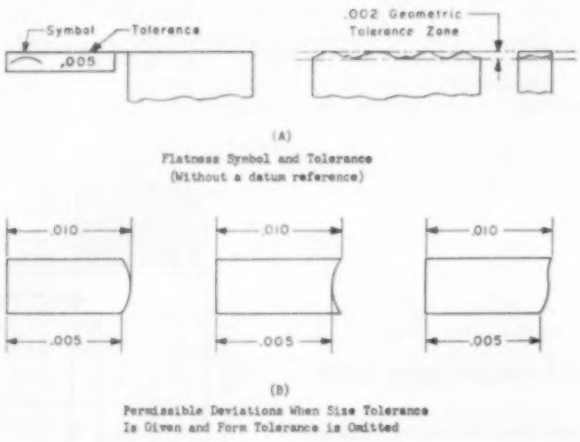


Figure 9 — Flatness

ASQC LCS Code 120;713:60;70:400
Figures accompanying this article are from MIL-STD-8B by Robert L. Davis.

total geometric tolerance 0.004 instead of the specified 0.002 (Fig. 8).

Abbreviations

In order to conserve space in this article, two non-standard abbreviations will be used hereafter. Geometric tolerance will be GT. Size tolerance will be ST.

Flatness and Straightness

In the current revision of the military standard (MIL-STD-8B) flatness and straightness have been combined under the symbol ⌒, which now supersedes the symbol ⏥ previously used for flatness alone.

FLATNESS is the permissible surface deviation from a plane within ST. The GT for flatness specifies the distance between two parallel planes within which all points on the surface must lie (Fig. 9A).

Without a controlling GT, the end plane deviations shown in Fig. 9B would be passed by inspection as being within ST but would be rejected if the refinement of a GT had been specified. On the other hand, the part shown in Fig. 9C would be acceptable as being within both ST and GT.

STRAIGHTNESS may apply to either an axis or a surface other than a plane. When applied to an axis, the tolerance zone is a diameter within which the axis must lie (Fig. 10A). Notice that in this case the leader from the symbol box is drawn to the axis line.

When straightness of surface is more important than straightness of axis, the tolerance zone establishes an area of permissable deviation from a straight line within which the feature surface must lie (Fig. 10B). In this case the leader from the symbol box is drawn to the surface in point. Fig. 10C shows acceptable deviations that might occur if size dimensions only were specified and the GT were omitted.

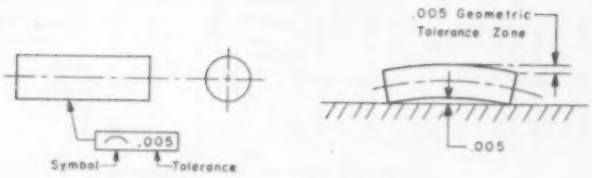
Angularity

Angularity, ∠, is the tolerance that controls the angle at which a surface or axis must lie in relation to a datum surface, datum angle or datum median plane. This symbol is used for oblique angles only, as right angles are controlled by perpendicularity.

An angle controlled by a radial tolerance of degrees, minutes or seconds may be zero at the vertex and become much wider as the distance from the vertex increases (Fig. 11A). The angled surface increases or decreases in linear

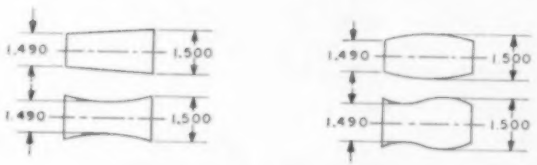
(A)

Straightness Applied to the Axis of a Cone



(B)

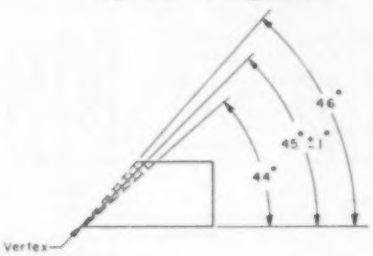
Straightness Applied to the Surface of a Cylinder



(C)

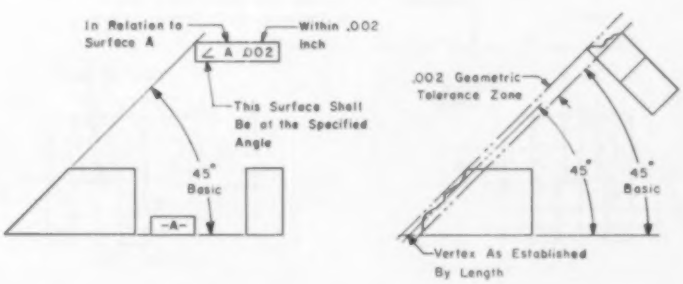
Permissible Deviations when Size Tolerance is Given and Form Tolerance is Omitted

Figure 10 — Straightness



(A)

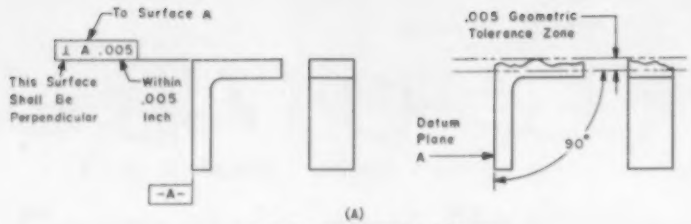
Angular Surface with a Radial Tolerance



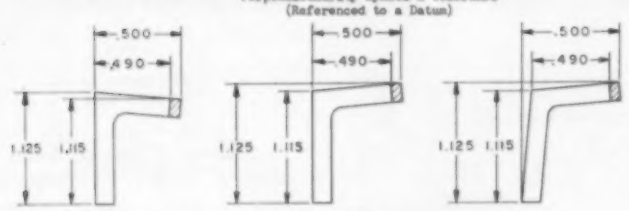
(B)

Angularity Controlled by Geometric Tolerance

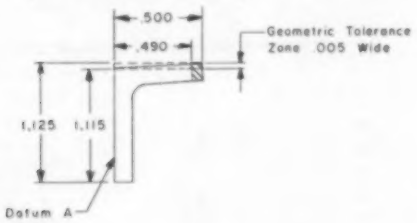
Figure 11 — Angularity



(A)
Perpendicularity Symbol & Tolerance (Referenced to a Datum)

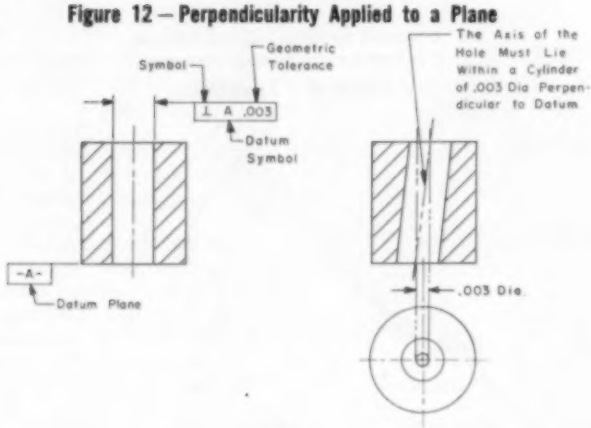


(B)
Permissible Deviations When Size Tolerance is Specified & Form Tolerance is Omitted

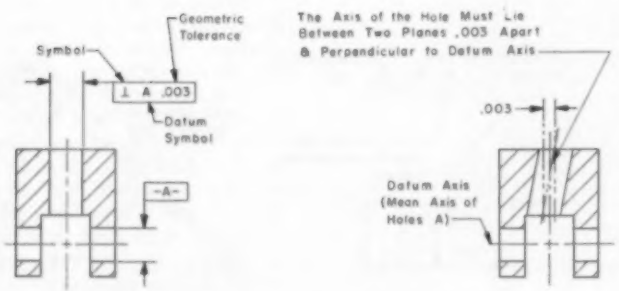


(C)
Perpendicularity, Within the Size Dimensions Referenced to a Datum

Figure 12 — Perpendicularity Applied to a Plane



(A)
Perpendicularity of Hole to a Datum Plane


Symbol
Geometric Tolerance
⊥ A .003
Datum Symbol
-A-
The Axis of the Hole Must Lie Between Two Planes .003 Apart & Perpendicular to Datum Axis
.003
Datum Axis (Mean Axis of Holes A)

(B)
Perpendicularity of a Hole to A Datum Axis of Two Holes

Figure 13 — Perpendicularity of Holes or Cylinders

measurement when toleranced by this method, and parts may exceed the ST.

The GT, in contrast to radial tolerance, is linear and the length of the angled surface must be established by coordinates. The tolerance zone is the distance between two parallel planes inclined at a specified angle from a datum, within which the entire surface must lie (Fig. 11B). The vertex of the angle must lie exactly midway between the parallel planes.

Of all the geometric characteristics, angularity is the one most likely to present problems in machining.

Perpendicularity

The symbol for perpendicularity, ⊥ , is self explanatory in that it graphically indicates the desired condition — two surfaces or axes located at a right angle to each other. Geometrically, the surface or axis is to be exactly 90° from a datum.

Applied to a surface, the tolerance zone is the distance between two parallel planes, exactly 90° from the datum, within which the entire surface must lie (Fig. 12A). Conditions which would pass inspection as being within ST but would be rejected if a GT had been specified are illustrated in Fig. 12B. The identical feature controlled by a GT is shown in Fig. 12C.

When the feature is a cylindrical hole and the datum is a plane surface, the axis of the hole must lie within a tolerance zone of specified diameter perpendicular to the datum (Fig. 13A).

If both the feature and the datum are cylindrical holes, the tolerance zone of the feature is a diameter the axis of which is perpendicular to the mean axis of the datum hole (Fig. 13B).

Parallelism

The symbol ∥ illustrates the definition of parallelism, the condition in which two or more planes or straight lines extend in the same direction and are equidistant at all points. The tolerance zone is a width or diameter parallel to the datum surface or datum axis, within which the feature surface or axis must lie.

When both feature and datum are plane surfaces, the tolerance zone is contained within two planes parallel to the datum surface (Fig. 14A). When both feature and datum are parallel cylindrical holes, the tolerance zone is a diameter around the feature axis parallel

to the mean axis of the datum hole (Fig. 14B).

Concentricity

Expressed by the symbol ⊙, concentricity is the condition of any combination of two or more regular features, such as cylinders, cones, spheres, hexagons, which have a common axis. The Total Indicator Reading (TIR) is always shown in the symbol block for this characteristic.

The tolerance zone, or zones, is a diameter within which the axes of the features to be concentric must lie. The axes of the feature and the datum should coincide, but in practice, an eccentricity of one-half the tolerance zone is allowed. The eccentricity may apply to the feature only, both datum and feature, two or more features having a common datum, or two datums with a common feature.

The concentricity of a cylindrical feature surface to a cylindrical datum feature is shown in Fig. 15A. Fig. 15B illustrates the permissable deviations from perfect concentricity. Although the tolerance zone is a diameter around the feature axis, when the part is mounted on the datum surface, the concentricity is measured on the O.D. of the feature.

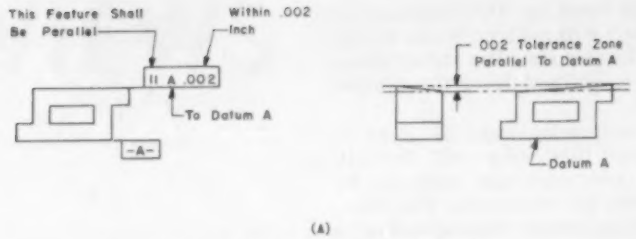
A part having two datum cylinders with a common feature cylinder is shown in Fig. 15C. Concentricity of the datum diameters is specified in relation to their mean axis; the concentricity of the feature diameter is also specified as being related to the same axis. The concentricity tolerance on diameters specified as mutually concentric, such as A and B in Fig. 15C, is measured coaxially.

When two holes of different size, such as a hole and a counterbore, must be concentric to each other the allowable eccentricity would, in most cases, apply to their common mean axis (Fig. 15D). This would be especially important if the holes were to retain a mating part of two different diameters, which would also be allowed an eccentricity.

Roundness

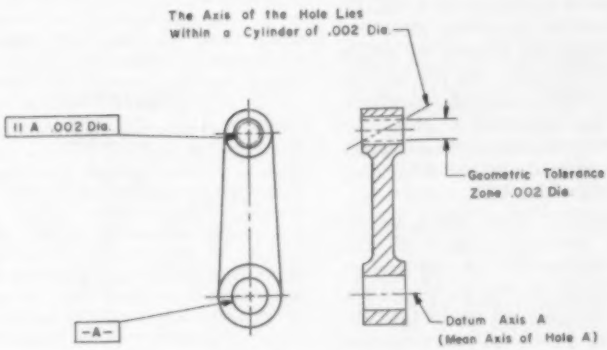
The geometric characteristic of roundness is shown by the symbol ○. It specifies a condition in which the surface of a cylinder, cone or sphere, if intersected by a plane perpendicular to the axis, would be equidistant from the axis at all points.

The GT is the difference in the diameters of two concentric circles between which the toleranced



(A)

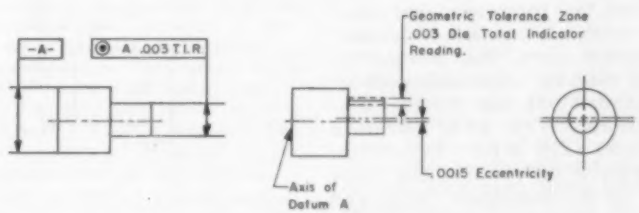
Parallelism when Feature & Datum are Plane Surfaces


The Axis of the Hole Lies Within a Cylinder of .002 Dia.
// A .002 Dia.
-A-
Geometric Tolerance Zone .002 Dia.
Datum Axis A (Mean Axis of Hole A)

(B)

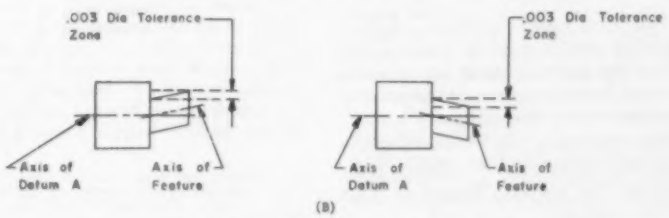
Parallelism when Feature & Datum are Axes

Figure 14 — Parallelism



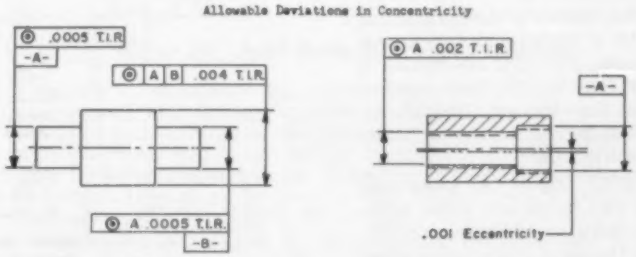
(A)

Concentricity of Cylindrical Surfaces



(B)

Allowable Deviations in Concentricity



(C) Concentricity of Two Datums & a Feature

(D) Concentricity of Holes

Figure 15 — Concentricity

surface must lie. This tolerance is not used with reference to a datum or to feature size. The abbreviation DIA. is omitted from the symbol block.

Consideration must be given to the fact that there will be both rigid and non-rigid parts to be checked for roundness. The manner of indicating the requirements and the method of checking the parts is somewhat different.

Roundness specified for a RIGID part is illustrated in Fig. 16A. Depending upon the method by which the part is checked, the GT will be the permissable out-of-roundness of either the diameter or the radius. To prevent excessive ovalness, the GT should be considerably smaller than the ST.

NON-RIGID parts must be allowed a certain amount of distortion, due either to the weight or flexibility of the parts, or the internal stresses set up in fabrication, when external forces applied during manufacturing are removed. In MIL-STD-8B the allowable distortion is referred to as "free-state variation." The free-state variation, however, may not be such that the part cannot be brought into ST during assembly.

When the geometric characteristic symbol is applied to a small or simple part, the words "IN FREE STATE" are added under the symbol box and the diameter is labeled "AVG DIA," Average Diameter (Fig. 16B). The average diameter is the mean of not fewer than four diameters measured across a circular or spherical part, in its free state.

Symmetry

The symmetry symbol, ⌯, specifies that a part or feature has either the same contour on opposite sides of a datum, or a plane or axis common with the datum.

The tolerance zone feature is the distance between two planes parallel to the median plane or axis of the datum.

Fig. 17A shows a noncylindrical part with a feature slot referred to a datum. Fig. 17B illustrates a condition in which the median plane of the feature lies at an angle, within the tolerance zone, to the datum plane.

Fig. 17C shows a condition wherein two holes are to be symmetrical with two datum slots. In this case the axes of the holes must lie within a tolerance zone parallel to the median planes of the datums.

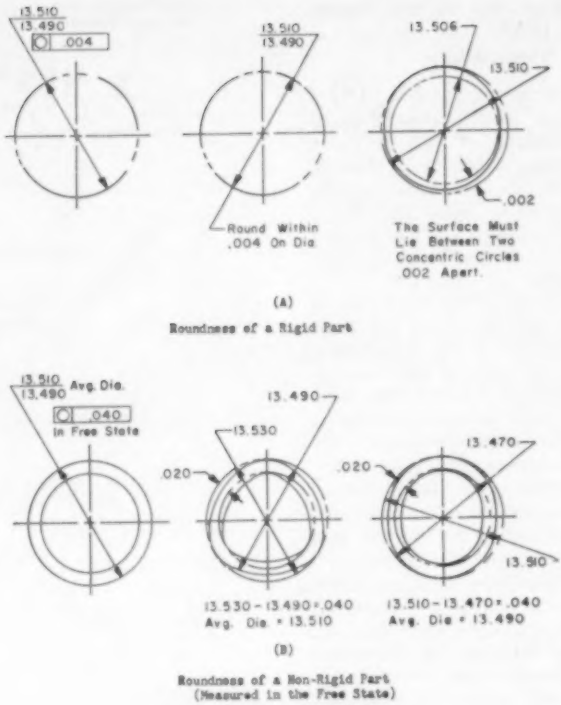


Figure 16 — Roundness

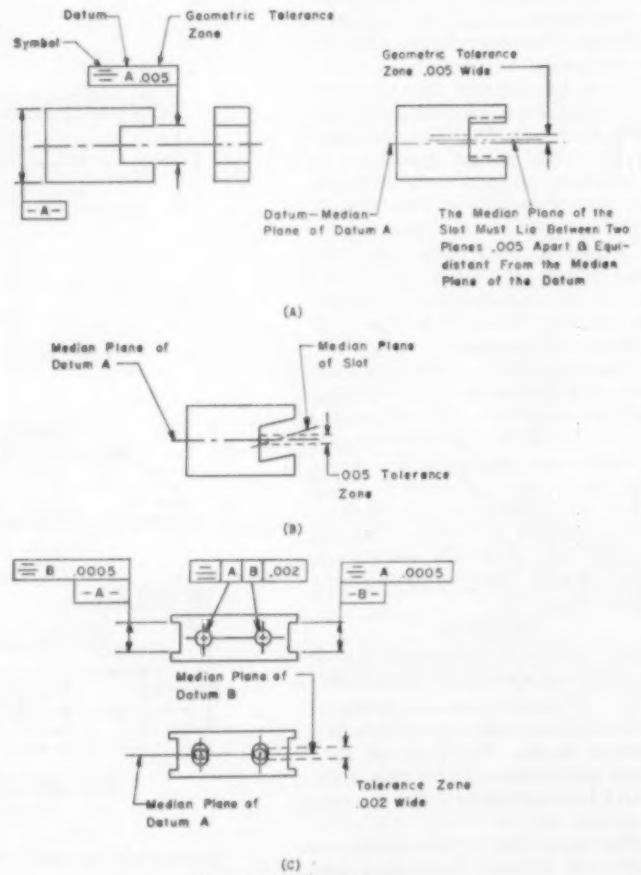


Figure 17 — Symmetry

BOOK REVIEWS

W. D. Baten, Editor
26 University Drive, East Lansing, Mich.

ELEMENTARY MATHEMATICS OF LINEAR PROGRAMMING AND THEORY, Edward G. Bennion, MSU Business Studies, 1960, Bureau of Business and Economic Research, College of Business and Public Service, Michigan State University, East Lansing, Mich., 140 pp., $5. Reviewed by Dr. Dean E. McKee, Agricultural Economist, Farm Economics Research Division, ARS, USDA, Michigan State University, East Lansing, Mich.

Linear programming and game theory are basically methods of solving particular types of mathematical problems. As with many other phases of mathematics, linear programming and game theory may be usefully applied to the analysis of problems in business and economics as well as to other applied fields, if one can state the conditions of the problem in the appropriate mathematical form. Without an understanding of the mathematical rationale underlying these techniques, the user is limited to following mechanically a step by step set of instructions as to how to set up and solve the problem. As a result many useful applications are often overlooked.

As linear programming and game theory are essentially mathematical subjects, much of the literature has been written in rather advanced mathematical terminology, making it difficult for many potential users of these techniques to acquire an adequate understanding of them. On the other hand, there is also a substantial body of literature in this area that is non-mathematical but that tends to concentrate primarily on the details of particular applications that have been made or on the arithmetical mechanics of finding a solution. It is not easy to obtain an understanding of the basic fundamentals of the techniques from such discussions.

Mr. Bennion has attempted the very difficult task of writing a book dealing with the mathematical essentials of linear programming and game theory at an elementary mathematical level. In his discussion he largely deals in terms of abstract mathematical concepts rather than documenting enumerable applications to illustrate the use of these methods. He proceeds mainly on the assumption that if the reader can grasp the mathematical logic of the techniques he will be able to see for himself how they can be applied in his own particular field of interest. The author is to be commended for taking this approach. There is a definite need for material in this subject matter area written in this vein.

Following a brief introduction to the subject of linear programming and game theory in Chapter I, the author presents a simple orientation problem dealing with how to determine the most profitable blend of materials for producing a commercial fuel oil of specified characteristics. This simple problem is used repeatedly throughout the book to illustrate various aspects of the two techniques.

In Chapter II, the principal mathematical concepts relating to the linear programming problem and its solution are presented. In this chapter the author draws heavily on the material presented in Part II of Charnes, Cooper, and Henderson's *Introduction to Linear Programming*.* The author's efforts to summarize and simplify this material has resulted in some serious gaps in the development of the mathematical logic. The reader is on occasion unable to see the relevance of particular mathematical relationships to the line of reasoning being developed. The value of this chapter would have been greatly increased by greater use of footnotes directing the reader to supplementary material giving a more complete development of the mathematical concepts being used. In this reviewer's opinion, a somewhat different mathematical approach might have been taken which would have been more readily comprehended by the reader whose training in mathematics is rather restricted. This is particularly true in regard to the geometrical constructs that are used.

In Chapter III the author discusses the "simplex method" of solving the linear programming problem and the mathematical relationship among the elements in the extended "simplex tableau." The algebraic derivations of the various algorithms used in conjunction with the "simplex method" are quite clearly developed in an appendix to this chapter. Careful study of this and the preceeding chapter should provide one with a fairly good understanding of the basic mathematics of linear programming.

The circumstances under which degeneracy occurs in solving the linear programming problem, the way in which it is recognized, and methods of handling it are discussed in Chapter IV. In Chapter V the author discusses problems for which no finite maximum (minimum) exists and the problem of obtaining an initial feasible basis with which to begin the iterative process of solving the linear programming problem. The concept of the "dual" is taken up in Chapter VI.

Chapters VII, VIII, and IX are devoted to a discussion of game theory and the relationship between game theory and linear programming. In Chapter VII the characteristics and the solution of a zero-sum, two-person game are discussed. In Chapter VIII the author illustrates how a game may be solved by stating it as a linear programming problem. The converse procedure of stating a linear programming problem as a game is taken up in Chapter IX. The discussion in these chapters is at an elementary level but does show clearly the relationship between linear programming and game theory.

The exposition of this book is essentially mathematical. However, it can be read profitably by anyone having a good grasp of college level algebra. The author concentrates upon the mathematical logic upon which linear programming and game theory are based. He does not burden the exposition with description of the details of how the techniques might be adapted to fit the needs of specific applications. He has made substantial progress toward accomplishing his objective of writing an elementary book on the mathematics of linear programming and game theory. This type of treatment is something that is much needed. However, a somewhat more complete development of the underlying mathematical concepts that are used would have been desirable.

*Charnes, Cooper and Henderson, *Introduction to Linear Programming*. John Wiley and Sons, New York, 1953.

New QC and Reliability Handbook

Readers of *Industrial Quality Control* should know that a new handbook in the Quality Control and Reliability series has been published by the Office of the Assistant Secretary of Defense (S&L). DoD Handbook H-109, "Statistical Procedures for Determining Validity of Suppliers' Attributes Inspection," may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. (price—30 cents).

This handbook provides appropriate statistical tests and tables of critical values for use in determining the validity of suppliers' inspection records when sampling inspection by attributes is specified in the contractual document.

What's New?

ROY A. WYLIE, *Editor*
Ampex Corporation

P-11-1—A completely transistorized battery-operated ultrasonic instrument for measuring wall thickness between 0.025 inches and 2.50 inches has been added to the line of test systems available from Magnaflux Corp. The Sonizon SO-300 gives instantaneous reading by simply placing a transducer on the surface to be measured and turning a dial. The portable unit is housed in a high impact-proof plastic case which measures 8½ x 9½ x 11¼ inches. A separate carrying case for batteries is equipped with shoulder straps for use outdoors. The unit measures with an accuracy of ± 1 percent when calibration is checked during tests against a known sample of the same material. Three knobs provide complete control of the test procedure. To determine the thickness of a material, the operator selects the correct range and places the transducer on the surface to be measured. He then rotates the harmonic scale disc until division lines coincide most accurately with the light pattern caused by a rotating neon bulb flashing in phase with scanned frequency. The thickness indicator then points to the direct thickness reading, in inches, on the outer scale. Both quartz and the more sensitive lithium sulphate transducers can be used with the SO-300. A liquid couplant must be applied in order to transfer ultrasonic vibrations between the transducer and the test material.

* * *

P-11-2—Contronics Inc. has announced the production of an automatic Diode Recovery Time Tester. The one unit can automatically do the work formerly performed by up to six operators using oscilloscopes and auxiliary equipment. By having all time and voltage discriminations performed electronically, accuracy has also improved. There are two existing methods of measuring recovery time of diodes. One involves a forward current source, a high speed switch, and a reverse voltage source as required by the Jan 256 military specifications. The result of this method is an equivalent reverse resistance as a function of time. The other method utilizes a forward current source, a high speed switch and a reverse current source. This method results in "total" recovery time since the measurement is only accomplished at the time the diode is completely recovered. Two classes of machines are available for each method of measuring diode recovery time, with two models in each class; small desk console which can be fed manually or an automatic model designed for taped components. The automatic model measures the D.C. parameters and the recovery time, automatically cutting the diode out if it fails to meet the set-in criterion.

* * *

P-11-3—Sizes of DoALL rectangular gage blocks 0.050 inches and larger are now etched on the side and clearly visible while stacked. This improvement applies to both the standard type and the new stainless steel blocks. Boxes for the new blocks have been designed to take full advantage of the side-etching feature. Side etching facilitates the use of gage blocks in many ways. It is no longer necessary to disassemble a stacked combination in order to recheck the block sizes. Individual block dimensions can be seen at all times and the total dimension of the combination is easily determined. The new case for the side-etched blocks also makes it easier for more than one person to use one set. The sizes of all blocks are visible whether they are in or out of the case. It is therefore easy to select alternate combinations to make up for blocks already in use.

* * *

P-11-7—A rotating microscope stage now permits microscopic top and side examination of tiny objects without moving them or holding by hand. Developed for use with low power microscopes, the new rotating stage is useful in the microscopic inspection and study of tiny components and assemblies, material samples, contact lenses, resistors, transistors, miniature gears, gems, minerals, biological and other specimens. The object is placed on the revolving stage for study under the scope. A touch of the finger revolves the center platform and rotates the object for examination. An angled first surface mirror permits top and side viewing without the necessity of upsetting the object or holding by hand. A flat edge on the rotating wheel indicates a complete revolution. The unit is metal with plastic rotating parts and the size is 2 inches by 2 inches. Price is $9.95.

* * *

P-11-8—The Wallace Electronic Dynamic Testing Machine for rubber applies a dynamic strain to a test specimen which can be in tension, shear or compression according to choice, to provide a means of evaluating rubber compounds under dynamic conditions. It can also be used to study the effect of design

Our Cover

Portable X-Ray Unit

William G. Singiser, chief inspector, Colonial Iron Works Co., Cleveland, Ohio, has designed a lightweight cart to take a Westinghouse Baltograph 260 KV unit into the shop.

He is shown making an X-ray of a weld seam on a 3/8 inch thick stainless steel nozzle.

Colonial formerly used a stationary 140 KV unit mounted on a skid which was moved through the shop by overhead crane.

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and shape on the dynamic behavior of moulded components. Two temperature control chambers are provided so that the dynamic properties of visco elastic materials can be studied under varying temperatures. These chambers are designed to fit around the specimen so that only the specimen is brought to the correct temperature. Adequate provision is made to insulate the temperature chambers and to prevent excessive heat transfer to or from adjacent components. The machine provides convenient adjustment of frequency, amplitude and temperature. A means is provided for adjustment and measurement of static strain and static stress. In order that dynamic values may be conveniently measured, means are provided of separating out static components.

* * *

P-11-13—Recordaflux, a new magnetic particle inspection system, has been placed on the market by the Instruments Division of The Budd Co. Recordaflux is used to detect defective welds, cracks, inclusions and other flaws in such materials as can be inspected by magnetic particle systems. The new system has been used successfully to determine non-destructively the diameter of spot welds in stainless steel, such as cold rolled types 301 and 201 and in precipitation hardening grades such as PH15-7MO and AM355. Since there is a direct correlation between the diameter of a resistance spot weld and its tensile shear strength, Recordaflux can supply reliable weld strength information. The system consists of a specially developed solution that contains magnetic particles. When sprayed or poured on the surface of a part, the magnetic particles are free to migrate in the solution. When the solution sets up as a strippable plastic film, the magnetic particles are frozen in place. The first two solutions being offered have setting-up times of twenty minutes and eight minutes respectively without the aid of external heat or drying. The solutions are formulated to offer good visual contrast between the particles and the part. The Recordaflux patterns of magnetic particles show, with great clarity, the shape and size of a spot, or other type of weld, making it easy to detect a defective joint. It will also pinpoint other flaws, such as cracks and inclusions. The patterns may be viewed on the part and washed away or they may be stripped from the part, viewed, and filed away for reference. Copies of the patterns are readily obtained by passing the Recordaflux films through reproduction equipment. In addition to these solutions, specially designed magnetizers provide a relatively uniform magnet field over a fairly large area, allowing for sensitive detection of faint local differences in magnetic properties within the working area of the magnetic field. Additional applications for this system are magnetic field studies and the determination of grain direction in sheet metal and sectional forgings.

* * *

P-11-11 — A portable laboratory monitor that operates visually and audibly in detecting and measuring radiation has been announced by Picker X-Ray Corp. The instrument can be used to monitor continuously, background radiation, measure sample activity, and check the contamination of hands, clothing, glassware, planchets, bench tops and a wide variety of other laboratory items. The monitor has a large meter that accurately indicates counts per minute, volts and twice-line frequency. A variable loudspeaker for audio monitoring of the general vicinity, recorder output, controlled voltage supply, and a detachable probe are versatile parts. The probe can be attached to the cabniet either vertically or horizontally. In the vertical position, small objects can be placed under it for quick checking. Horizontally, larger items can be inspected in front of the probe. It is readily detachable and can be placed by hand in any position. The monitor weighs 19 pounds and measures 10 x 12 x 8 inches and operates on a power of 105 to 125 volts, 50-60 cycles, 65 watts.

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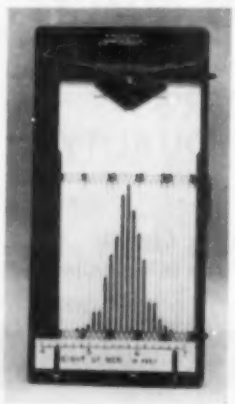

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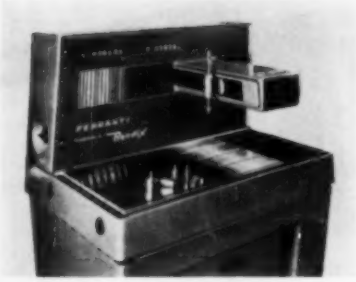

P-11-5—The Bendix Corporation's Industrial Controls Section has introduced a new concept of two dimensional inspection. The Ferranti FI-22 Coordinate Inspection Machine is a compact, solid state unit which can read out hole center locations in two axes simultaneously to an accuracy of 0.001 inches. This single unit inspection laboratory is capable of checking complex workpieces up to ten times faster than conventional inspection equipment. Measurement is accomplished by moving a probe along a fixed axis to which is attached an accurately ruled grating. A moire' fringe pattern is created by the imposition of a movable reference grating over the fixed grating. By reading both the dark and light phases of the fringe pattern, the electronic counting units of the FI-22 are able to record 0.001 inches increments on a scale which is ruled with 500 lines per inch. Probe position is displayed on two sets of position indicators—one for each axis. The system will accurately record probe movement at speeds of up to 30 inches per second. The F-22 has a floating zero which may be established at any point within its 24 x 15 inches working range. Positive motion may be read in either direction through the use of inverting switches for each axis. A selection of interchangeable taper probes and flat center ground probes will permit the inspection of any hole or edge location. By using a scribe in place of the inspection probe, the machine is capable of fine layout work.

* * *

P-11-14—When tinplate is shipped in sheets, quality can be effectively controlled by separating the sheets in accordance with specified standards. However, when tinplate is shipped in coils (an increasing trend), defects are scattered throughout the coil and quality control becomes difficult. Airborne Instruments Laboratory has devised a system for electrotinning lines that makes use of existing sensing stations, and automatically records the required quality control data in two forms—printed ticket and punched paper tape. The system records the extent of deviations in predetermined characteristics for each coil in production runs. The coil data

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accumulation system consists of a visual inspection station, a main cabinet, and an output cabinet—together with interconnections to existing sensing gages on the electrotinning line. When a coil is entered into the line, the operator sets the knobs on the manual input cabinet to indicate the date, turn, crew, coil order number, temper base weight, line operation, and strip width. This information is then transmitted to the electric typewriter in the output cabinet. The typewriter records all the information received from the manual input cabinet on a preprinted form. The visual inspection station is located at the end of the tinning line near the shear. Defect buttons on the control panel of the station correspond to the types of visual defects that may be present in the strip. When the inspector observes a defect in a strip passing by the inspection station, he presses the button on the panel corresponding to that defect, and holds the button down until the defect is no longer observed in the strip. A lamp located above each defect button lights during the time that the defect button is depressed. The main cabinet is located near the shear at the output end of the electrotinning line. It contains three independent computers, a comparing circuit, and a trouble indicator. Each of the computers in the cabinet is completely enclosed in a dustproof cabinet and a number of external test points are provided for operational checks. The data accumulation system uses four standard types of AIL logic plates, together with magnetostrictive lines. The logic plates accept the signals from the gages, properly delay each signal by an amount corresponding to the distance between the gage and the shear, accumulate the total output for each type of defect, and provide properly coded signals to operate the printer and cause the totals to be printed. To minimize the number of components in the system (and thus increase its reliability) a single logic circuit processes each of the defect classifications in turn. The system is internally compensated to correct for the timing errors that are introduced because some gages are located at significant distances from each other. The input devices used on the line include a pin hole detector of the photoelectric type, a Beta-Ray gage to measure base metal thickness and provide over-gage and under-gage signals, a set of four x-ray gages to determine tinplate thickness and supply signals indicating top plating light or heavy and bottom plating light or heavy. In addition, a footgage tachometer provides an accurate measure of strip length; the two visual inspector's stations provide signals as to footage of visual defects such as color markings, unmelted coating, etc. Welds are located by an operator, who presses a push button as the weld passes his station.

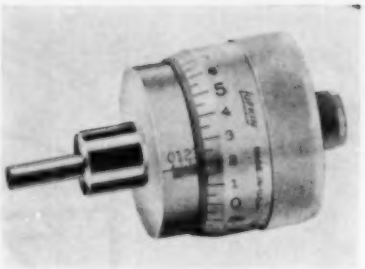
1960 Shewhart Medal Nominations

Nominations are now being received by the Shewhart Medal Committee for consideration with respect to the Shewhart Medal Award for 1960. Previous Medalists are:

L. E. Simon	—1948	E. G. Olds	—1954
H. F. Dodge	—1949	W. E. Deming	—1955
M. A. Brumbaugh	—1950	M. E. Wescott	—1956
G. D. Edwards	—1951	C. C. Craig	—1957
E. L. Grant	—1952	I. W. Burr	—1958
H. G. Romig	—1953	P. S. Olmstead	—1959

A letter of notification is being sent to all ASQC Section Chairmen. Any member of the Society is privileged to make a nomination for this honor. It is important, however, that any nomination be accompanied by suitable biographical and other information supporting the nomination so that the Committee will be able to give adequate consideration to the qualifications of the nominee.

Nominations may be forwarded to the Shewhart Medal Committee through the Chairman of the local Section, or they may be sent direct with supporting information to the Chairman of the Medal Committee, G. Rupert Gause, Bell Telephone Laboratories, 463 West Street, New York 14, New York. Nominations received by the Medal Committee on or before December 31, 1960, will receive consideration. Ten (10) copies of the letter of nomination and ten (10) copies of the supporting information will be needed for distribution to the Committee.



P-11-6—A new large diameter micrometer head No. 1011 designed for applications requiring extra-fine adjustment, such as electronic equipment, has been announced by the Lufkin Rule Company. It may be used on special gages and tools, fixtures, and various machine tools. It reads from left to right—the spindle recedes into the head as the reading increases. It is also available with markings on hub reading both ways. Specifications for the new No. 1011 large diameter micrometer head are as follows: measures by 10,000ths inch, range 0 to 1 inch, spindle length at 0 inch is 1⅛ inch, spindle diameter is 0.270 inches, clamping surface length is ¾ inches and diameter is 0.7505 inches.

* * *

P-11-9—Two new harmonic mixers which speed and simplify frequency measurements up to 18 KMC are now available from Hewlett-Packard Company. Model P932A fixed tuned harmonic mixer, operating in the 12.4 to 18 KMC P-Band, mounts directly to a waveguide system and operates with a Hewlett-Packard Model 540A or 540B transfer oscilloscope. The oscillator output is applied directly to the mixer which generates harmonics and mixes them with an applied unknown waveguide frequency. The mixer's beat frequency output is applied to the 540's oscilloscope, the oscilloscope tuned for zero beat scope indication and the oscillator frequency setting noted. Simple multiplication of the 540 dial frequency by the harmonic number yields the unknown frequency to within 0.5 percent. Measuring the oscillator frequency on a Hewlett-Packard 524 series counter increases the accuracy of measurement on clean cw signals up to 1 part in 10^7. Model P932A's maximum input power is 100 mw, and its minimum video output is 0.1 mv rms with 0 dbm input. The other harmonic mixer, Model 934A operates from 1 to 12.4 KMC, and extends the range of the Hewlett-Packard 540A transfer oscillator from 5 KMC to 12.4 KMC. The 934A offers the same advantages as the P932A, including the fixed tuned feature eliminating tedious adjustment. Its maximum input power is

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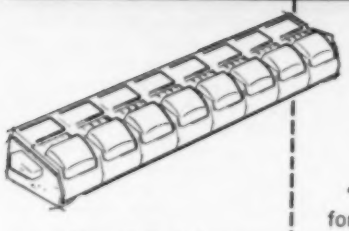

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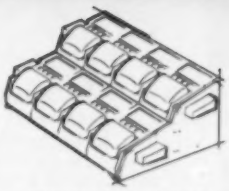

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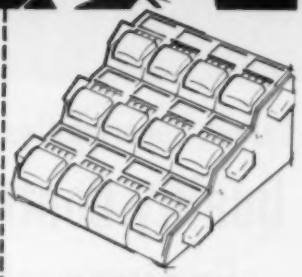

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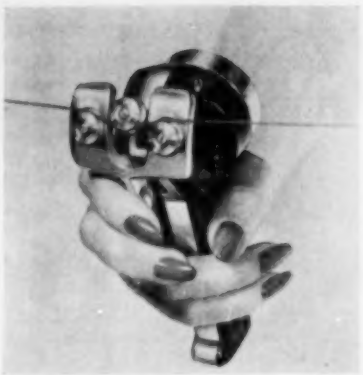
100 mw, and its typical sensitivity is —45 dbm at the mid-range points. The price of the Model P932A is $250.00 and the price of the Model 934A is $150.00. Both are available for delivery from stock.

P-11-10—An electronic device with the ability to spot flaws smaller than a match-head as it scans paper stock moving at a 1,000 foot per minute clip has been announced by RCA. The inspection system can detect dark spots or holes one-sixteenth of an inch in diameter at the high scanning speed. The system also keeps its electronic eye open for smudges, creases or wrinkles which may impair subsequent printing, as well as for defects in the paper stock's gloss. The unit can be used in both roll and sheet production to classify paper as "firsts," "seconds," or "rejects." The system inspects paper by monitoring the light reflected from its surface. The inspection head contains an illumination and viewing unit which, in combination with a series of photo-electric eyements, converts the visual quality of the paper surface into electrical information. A control rack separate from the detector unit contains the signal and classifying circuitry for processing information collected from the surface of the paper as it travels at high speed past the inspection head. Dark and light signals which exceed the normal mottled pattern of the paper are handled by separate channels. Controls for both dark and light channels can be adjusted easily to meet the inspection standards for any particular application.

* * *

P-11-4—Tektronix, Inc. has announced the Type 519 KMC Oscilloscope, a calibrated, high-speed, laboratory instrument designed for observation, measurement, and photographic recording of wideband phenomena. A 2 x 6 cm viewing area, coupled with 24 kv accelerating potential affords bright displays with excellent definition. Performance features include: passband from dc to beyond 1000 mc, risetime of 0.35 nsec, sensitivity of 10 v/cm, linear sweeps to 2 nsec/cm, and sweep delay to 35 nsec. All features (including a sensitive trigger system) are fully compatible with the signal bandwidth capabilities of the instrument. The single unit houses a fixed signal delay line, a convenient sweep-delay control, a pulse-rate generator, a standard amplitude and waveform generator, and regulated power and high voltage supplies. Only two connections are necessary for normal operation—signal input and power cord. The Type 519 is suited to single-shot or random nuclear events. In addition, its extreme bandwidth permits applications to general measurements where oscilloscope risetime must be much faster than signal risetime. The price of the Type 519 is $3800.



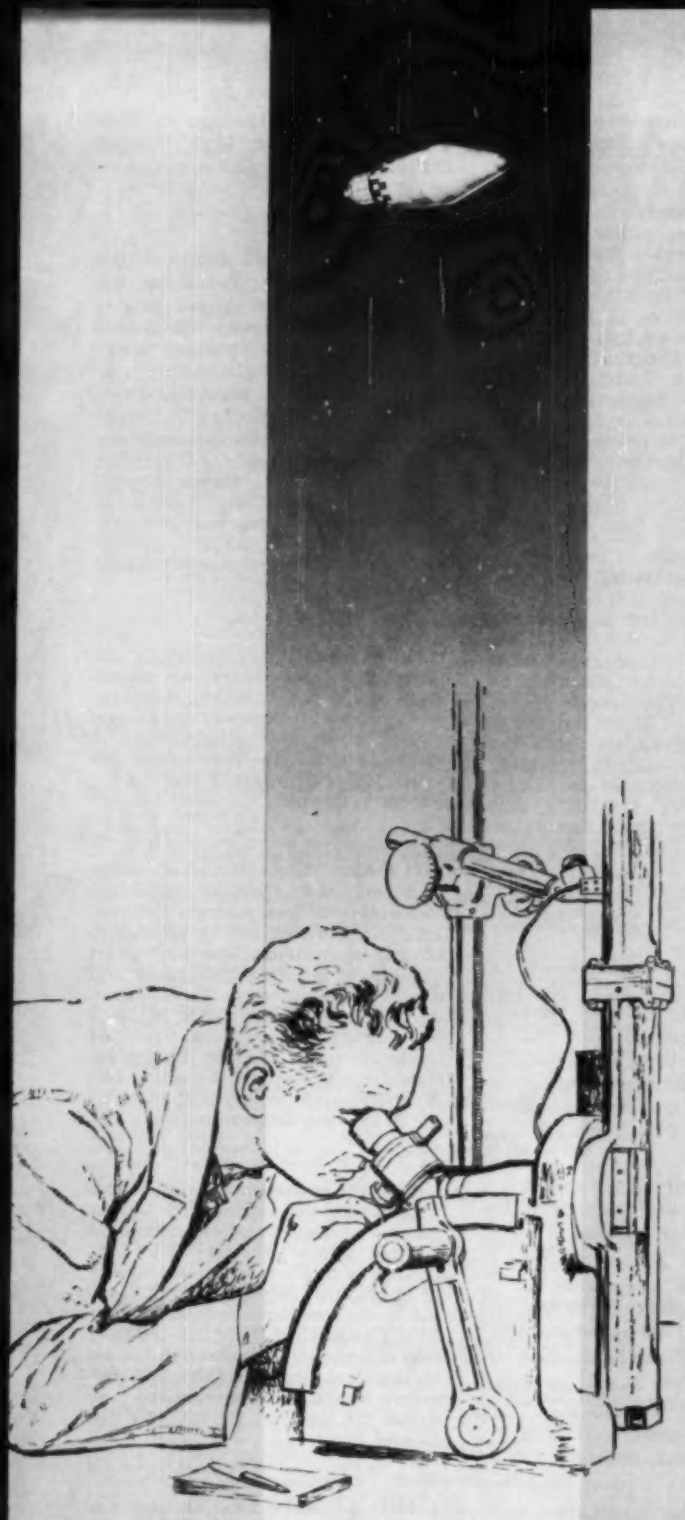
P-11-12 — A mechanical 3-roller shunt and low-inertia pulleys rotating on precise ball bearings, are featured in the new Saxl Tension Meter. The meter is quickly clipped in wires and yarns that move at high speeds, and due to the shunt, the wire or yarn is hardly shortened. In use, the trigger is pulled, the wire or yarn is brought in contact with the trigger-guide and upon release of the trigger, the kuide engages the wire automatically in proper test position. Readings are independent of the way the operator holds the tension meter. "Wiggling-in" is unnecessary. Tension on the moving wire or yarn is read in clear figures on the dial facing the observer. Its dual range, two color dial makes one tension meter the equivalent of two instruments with a scale over 12½ inches long. The tension meter has greatly extended resolution on the lower end of the scale where the most critical tensions lie. In addition, it extends dial range over 100 percent beyond the first revolution of the pointer. The instrument's damping has been increased for applications where i tis advisable to "average out" excessive oscillations of tension. The light weight and non-slip grip minimize operator's fatigue. The Saxl Tension Meter can be furnished also with cylindrical rollers to check tensions in plastic sheets, paper, magnetic tape, textiles, typewriter ribbons and foil for electrical condensers.

New Literature Available

L-11-1—Bausch & Lomb has revised its descriptive catalog which covers a complete line of readers and magnifiers. New items have been added to the 14 page illustrated booklet which lists over 65 individual models with powers from 2x to 20x. Specifications and prices are included for an extensive selection of round and rectangular readers, folding pocket magnifiers, watchmaker's loupes, surface comparators, enlarging focusing magnifiers, etc.

* * *

L-11-2—A new list of Commercial Standards revised to July 1, 1960 is now available from the United States Department of Commerce. The new index lists all Commercial



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Quality assurance at Lockheed parallels in importance and augments the research and development, projects and manufacturing organizations. Quality assurance engineers establish audit points, determine functional test gear, write procedures and perform related tests.

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Lockheed

MISSILES AND SPACE DIVISION

SUNNYVALE, PALO ALTO, VAN NUYS, SANTA CRUZ,
SANTA MARIA, CALIFORNIA · CAPE CANAVERAL, FLORIDA
ALAMOGORDO, NEW MEXICO · HAWAII

Standards under 22 classifications including Apparel and Apparel Sizing; Chemicals; Electrical and Mechanical Equipment; Hardware: Instruments and Tools; Heating, Ventilating and Refrigeration; Household and Hospital Supplies; Lumber and Wood Products; Millwork; Paper and Petroleum Products; Plastics; Plumbing Materials and Fixtures; Pipe and Fittings; Precious Metals; Rubber Products; Textiles; and Thermal Insulation Materials. (Cat. # 978 and Commodity Standards Pamphlet, Commodity Standards Division, Office of Technical Services, Business and Defense Services Administration, U.S. Dept. of Commerce, Washington 25, D.C.

* * *

L-11-3—Accuray Extruder Measurement and Control System Brochure is the title of a new 12-page brochure available from the Industrial Nucleonics Corp. The new brochure describes methods of measuring and automatically controlling the three thickness variables of extruded plastic materials.

* * *

L-11-4 — A time-saving monthly service called the Nytl Laboratory Guide Reports, will become available this fall. These informative reports are designed to bring quick and authoritative answers to many typical problems encountered in laboratory procedures. Much of the information contained in these reports is not readily available through ordinary channels. Each month subscribers will receive at least four Guide Reports drawn from the more than 300,000 Test Programs conducted by New York Testing Laboratories at the N.Y. headquarters and subscribers will thus accumulate an ever growing single reference which can become a useful adjunct to any technical laboratory.

* * *

L-11-5—A new manual on methods and equipment for testing insulating materials has been compiled by Associated Research, Inc. Some of the subjects covered in this new manual are: High Voltage Breakdown Testing of Insulating Materials in Accord with ASTM Specifications; Automatic Rate of Rise Control for High Voltage Breakdown Testing of Insulating Materials; Determining Resistance to Arcing of Insulating Materials; Testing Insulating Oils for High Voltage Breakdown; Detection of Corona Leakage in High Voltage Equipment; High Voltage Breakdown Testing of Power Cables and Bushings.

* * *

L-11-6—Bulletin 265 describes the Albert Torsion Tear Tester and the method of operation as well as giving typical applications. The Tester was developed to measure shear strength or tearing resistance of strongly directional materials which are difficult to measure by other test methods. Reinforced shipping tape, corrugated boxboard, textiles, highly calendered rubber stocks, etc. usually tear at right angles to the direction of greatest strength. The Albert Torsion Tear Tester insures a measurement not procurable in any other way.

* * *

L-11-7—A brochure describing the Model 212 Sorptometer, an instrument for rapid accurate measurement of surface areas of solids and other adsorption phenomena, is available from the Instrument Division of the Perkin-Elmer Corp., Norwalk, Conn.

* * *

L-11-8—The Cleveland Instrument Company has made available its "Sources of Measurement Error" wall chart, which can be applied to all gaging systems. The wall chart has quick reference diagrams and explanations showing: Factors Producing Measurement Error; Methods of Avoiding These Errors; Required Gage Accuracy vs. Part Tolerance; How to Get the Most Accuracy Out of Your Gages; Simple Experiments To Train New Inspectors.

* * *

L-11-9—The American Standards Association has announced a new edition of the American Standard Unified Screw Threads, B1.1-1960 published by The American Society of Mechanical Engineers. The Standard is credited with bringing American, Canadian and British industry into closer harmony through the interchangeability of screws and fasteners among the mechanisms produced by Canada, Britain and the United States.

* * *

L-11-10—A vest-pocket size table of conversion factors dealing with weight-volume, gravity of light and heavy liquids, base weight, power, temperature, pressure, flow and length-area can be obtained free from the Ohmart Corp., makers of Ohmart Nuclear Gages for control of specific gravity and density, level, thickness, interface. The table has been prepared for convenient reference use by production, process, and instrument engineers.

"TO THE MAN"

To reach the man who must make the decisions, the man who sets the course of his company through the sea of competition, the Wichita section for the past year has been sending *Industrial Quality Control* to the heads of many area industries. By using IQC as our ambassador, we hoped to introduce quality control and ASQC to a number of business managers who were unfamiliar with us.

It was our hope that after looking over his copies each would pass his magazines along to his subordinates for study and consideration of suitable applications in their own companies.

We undertook the project with some misgivings. After reviewing our membership, it was apparent we had a large void of members and support from several important industries. While we felt that quality control should be introduced through company management, we were a little afraid they might be too busy to be bothered.

In spite of these doubts we undertook project, "To the Man," because we are sold on the value of ASQC and were convinced that this was one excellent way to introduce the concepts of quality control to our new industries.

Our fears proved to be totally unfounded. The results were highly gratifying. We received numerous letters of thanks and a positive increase in new members and industry representation. We plan to continue project, "To the Man," again this year and look forward to even wider industry acceptance. The Wichita section would like to recommend this approach to other sections who would bring the message of quality control to new companies and new industries in their own area.

Al Rossman
Wichita Section

ANNUAL REPORT of the BOARD OF DIRECTORS

American Society for Quality Control, Inc.

The Board of Directors of the American Society for Quality Control, Inc., submits herewith its Annual Report covering the fiscal year beginning July 1, 1959 and ending June 30, 1960. This report reviews briefly the principal activities of the Society and summarizes the more important actions taken by the Board and by its Executive Committee during the year.

The first meeting of the Board was held on May 26, 1959 at the Hotel Sheraton-Cleveland, Cleveland, Ohio. The principal purpose of this meeting was the election of five Executive Directors to serve with the President and the Junior Past President as the Executive Committee. Those elected were:

H. Davis Birch
Allin P. Deacon
Gerald J. Lieberman
Warren R. Purcell
Albert W. Wortham

Subsequent meetings of the Board were held on November 13, 1959 at the Milwaukee Inn, Milwaukee, Wisconsin, on February 19, 1960 at the Statler-Hilton Hotel, New York, and on May 25, 1960 at the Sheraton-Palace Hotel in San Francisco. Acting for the Board, the Executive Committee met on May 28, 1959 in Cleveland, on September 22, 1959 in New York, again on February 18, 1960 in New York and on May 23, 1960 in San Francisco. At each of these meetings, the Officers of the Society were present to take part in the reviews and discussions of Society affairs.

In the continuing effort to improve and increase services to the membership through Society-sponsored programs and activities, the Board and Executive Committee have approved and implemented plans in the areas of Publications, Education and Training, Technical Committees, Professional Development and General Operations.

Significant progress has been made in the area of Professional Development. With the formation of the General Professional Council, to coordinate and unify programs designed to enhance the professional stature of Quality Control people, the several Committees concerned with these matters have been active in developing such programs. Development and documentation of the Work Elements of Quality Control and establishment of a foundation for professional certification are outstanding among these.

Further in the professional area, the Board established a new award, in the form of a medal, to be awarded in recognition of outstanding leadership in the administration and application of modern methods of Quality Control in industry. Named the Edwards Medal in honor of the Society's first President, George D. Edwards, the initial presentation was made at the Annual Banquet at San Francisco.

The Board of Directors approved the formation of the ASQC Education and Training Institute. Charged with developing, coordinating and directing the Society's formal educational program, the Institute will bring to members opportunity to benefit from the formal programs and the training material it will formulate. The Management Workshop Seminars represent a modest beginning in this effort; the immediate years ahead should see substantial gains. The Board views the entire educational program as being of great importance to the membership.

In the technical area, important contributions have been made by the Divisions and Technical Committees. The Board approved the establishment of the Reliability Engineering Technical Committee; the Ad Hoc Committee assigned to lay the foundation for this new Technical Committee has done an outstanding job in building a program and chartering a course for the work ahead. Formal organization of the Committee took place at San Francisco during the Convention.

Continued attention has been given to Publications, particularly to the Society's journal, *Industrial Quality Control*. Economies in publishing have been effected and these have been reflected in increased editorial material. Reader surveys have been conducted with the view to enhancing the value of the journal to the members.

Convention and Exhibition operations have been centralized in the Headquarters Staff, under the direction of the Administrative Secretary. While increasing the work load appreciably, the arrangement has the advantage of promoting uniformity of and conformity to established procedures. Future Convention sites have been selected, with Buffalo chosen for 1964 and Los Angeles for 1965.

Based on the recommendations of the special committee studying the Society's organizational and governmental structure, and the work of a small committee of Past Presidents, a proposed new Governmental Structure Plan was approved by the Board and adopted in principle by the membership in the Annual Postal Ballot. The new Plan provides for increased experience and maturity in the governing bodies of the Society and at the same time, provides for aggressive and expeditious administration of its affairs.

Improvements in the Society's business operations have continued, with resulting economies. Efforts are being made to extend the services of the Staff so as to be of greater assistance to the Sections and Divisions. The Society has continued its growth pattern, with a record high membership renewal rate of 83.5 percent and a record high total membership of 12,105. Four new Sections were recognized during the year, representing new areas of interest and enthusiasm for Quality Control and ASQC. A great deal of credit does to those Sections that have sponsored and encouraged these new groups. Along with this facet of growth, a slight favorable balance of income over expenses, experienced last year, was realized again this year.

The Board of Directors acknowledges and expresses appreciation for the significant contributions of all of the Officers to the many Society programs they have initiated and carried forward during the year. The Board also commends the officers and members of the Divisions, the Technical, Professional and Service Committees, and the several Ad Hoc Committees, for their efforts in furthering their projects and activities. Special appreciation is expressed to the Chairman of the Editorial Board and to the members of that Board for their substantial contribution to the Society through its journal, *Industrial Quality Control*.

The Board is appreciative of the work of its own representatives, the Executive Directors, for the guidance they have given to Society affairs. It also thanks the many Section officers and members for their efforts on behalf of the Society; the activities and programs sponsored by the Sections have contributed substantially to the overall advances that have been made during the year in meeting our objectives.

The Board of Directors is likewise grateful to the Society's Headquarters Staff, under the direction of the Administrative Secretary, for the continued efficient conduct of the many operations assigned to it. Additional functions have been assigned to the Staff and these have been carried on with the splendid enthusiasm that has been characteristic of all members of the group.

This year has seen significant progress in forwarding the programs that have been designed to advance the science of Quality Control and to enhance the professional stature of the members of the Society. This has been the result of the combined efforts of many individuals in all groups within the Society.

The genuine enthusiasm that has been displayed creates a fine environment for continued efforts, thus assuring even greater strides in providing increased benefits for members of the Society in the year ahead.

New York, New York
June 30, 1960

For the Board of Directors
C. Eugene Fisher, Chairman

Report of the Executive Secretary

Membership in ASQC continues its steady growth since the formation of the Society in 1946. As of June 30, 1960, it reached a new high of 12,103 (see Exhibit A). The net gain over June 30, 1959, is 791 or approximately three times the net gain shown for last year. Exhibit A also shows a record high percentage of renewals, 83.5 percent, the highest in the history of the Society. It is our hope in the future to continue improving this renewal rate through improved services to members. Following is a membership breakdown as of June 30, 1960:

1959-1960 Membership Breakdown

Associate Member	881	Renewals	9451
Member	8586	New Members	2652
Senior Member	2105		12103
Fellow	231		
	12103		
Enrolled Students	40		

The complete membership report as of June 30, 1960, is attached as Exhibit B. Since the last annual report, the following new sections have been admitted:

Section	Charter No.
Orange Empire (California)	111
Oklahoma City (Oklahoma)	112
Southern Illinois	113
Santa Maria-Vandenberg (California)	114

Two sections became inactive in the past year and have surrendered their charters. They are Baton Rouge - New Orleans (Louisiana) and St. Catharines (Ontario, Canada). By actual count there are 109 active sections, although 114 sections have been chartered. Mortality and amalgamation over the years accounts for the difference.

In the past year a revised ASQC handbook for section officers and district representatives was distributed. A membership roster of the Society was completed and made available to all members of ASQC requesting it. Also revised was the ASQC membership manual. Another "semi-periodical," the "Division Digest," was produced to improve communications between the Headquarters office and the division officers. This new bulletin service established the basis for providing new services for the division officers and the members of the Society's Divisions proposed for the next year. Among the proposed services for the Divisions is the publishing of Division Bulletins or News Letters to be produced at Headquarters and distributed from the Headquarters office to all the division members in the divisions cooperating in this program.

This past year the Headquarters office staff shortened the time lag for reporting new members and address changes to section secretaries and provided the section treasurers with monthly reports and the section allotment checks. This program evidently was most successful in that the renewal membership for the Society was the highest it has ever been in history. This coming year, as a result of a change in the Constitution and By-Laws of the Society last Spring, all sections of the Society will report their financial status for inclusion in the Society

Annual Report. This is an important step forward, enabling the Society's Internal Revenue report to contain all income and expenses by all branches of the Society, as required by law.

We wish to thank the sections of the Society in cooperating on the direct collection of dues by the Headquarters office. This participation has enabled us to utilize the most economical and modern procedures in processing the renewals and new members. Currently there are only two domestic sections not participating in this procedure. We sincerely hope that in the coming year these two sections will adjust their dues structure to permit incorporation in direct collection of dues. During the coming year we propose to furnish all participating sections with lists of their non-renewing members in August, thus permitting their Membership Committees to contact the unrenewed members earlier than in the past and aid in rapidly increasing the renewal rate, since the renewal rate is the real key to Society growth. We propose to furnish each section with the list of paid members in October, so that by comparing this list with the list as of June 30 the number of members still unrenewed can be noted. This will enable earlier work on maintaining section membership.

Your Executive Secretary and your Headquarters staff look forward to cooperating with you again in the next year and want to take this opportunity to thank all section and division officers, district representatives, individual members, committee chairmen, and the officers and directors of the Society for their comments and suggestions for improving Society service to every member and to the profession at large.

Milwaukee, Wisconsin
June 30, 1960

David S. Chambers
Executive Secretary

Exhibit A—Record of Membership Growth

Date	Members	Percent Renewals	Net Gain	Percent Gain	New Members	Active Sections
June 30, 1947	1,926				1926	25
June 30, 1948	2,102	*	176	9.1	*	31
June 30, 1949	2,638	75.2	536	25.5	1058	35
June 30, 1950	3.510	76.7	872	33.1	1489	42
June 30, 1951	4.245	80.5	735	20.9	1472	48
June 30, 1952	6,109	81.2	1864	44.0	2669	60
June 30, 1953	7,430	75.0	1321	21.6	2846	71
June 30, 1954	8.548	77.5	1118	15.1	2798	80
June 30, 1955	8.780	74.7	232	2.7	2399	86
June 30, 1956	9,673	78.6	891	10.3	2781	92
June 30, 1957	10,497	78.3	824	8.5	2924	97
June 30, 1958	11,063	79.2	566	5.4	2751	102
June 30, 1959	11,310	79.6	247	2.2	2510	107
June 30, 1960	12,103	83.5	791	7.0	2652	109

*No record

Report of the Tellers Committee

In respect to the election of officers for 1960-61, the following is the record of the votes:

For President:
Total Ballots Cast 2843
J. Y. McClure 2814

The balance of 29 votes was distributed among 24 write-in candidates, none of whom received more than five votes.

For Vice Presidents:
Total Votes Cast 10 971
L. S. Eichelberger 2768
A. V. Feigenbaum 2720
A. B. Mundel 2674
W. R. Purcell 2706

The balance of 103 votes was distributed among 82 write-in candidates, none of whom received more than three votes.

For Executive Secretary:
Total Ballots Cast 2830
D. S. Chambers 2819

The balance of 11 votes was distributed among 11 write-in candidates.

For Treasurer:
Total Ballots Cast 2827
R. L. Fiaschetti 2805

The balance of 22 votes was distributed among 19 write-in candidates, none of whom received more than two votes.

Since the candidates of the nominating committee above received the majority of the ballots cast, the committee hereby declares the above officers to be duly elected.

In respect to the voting on the constitutional amendments, the Constitution states that in order to validate the voting the total ballots cast for and against an amendment must be 25 percent of the corporate membership of the Society. In order for adoption the majority of ballots must be for the amendment and 75 percent of the sections, counting the ballots by sections on a unit-rule basis, must be for the amendment.

Corporate Membership 10,790
25 percent of Corporate Membership 2690

Amendment No. 1 and A:
Valid ballots cast 2854
For 2730
Against 124

Amendment No. 2 and Resolution No. 2
Valid ballots cast 2854
For 2724
Against 130

Amendment B:
Valid ballots cast 2848
For 2655
Against 193

Nineteen ballots were declared invalid by the committee because the members failed to sign the voting envelope.

Ballots were received from 111 sections. Under the unit-rule tally all sections voted in favor of all amendments.

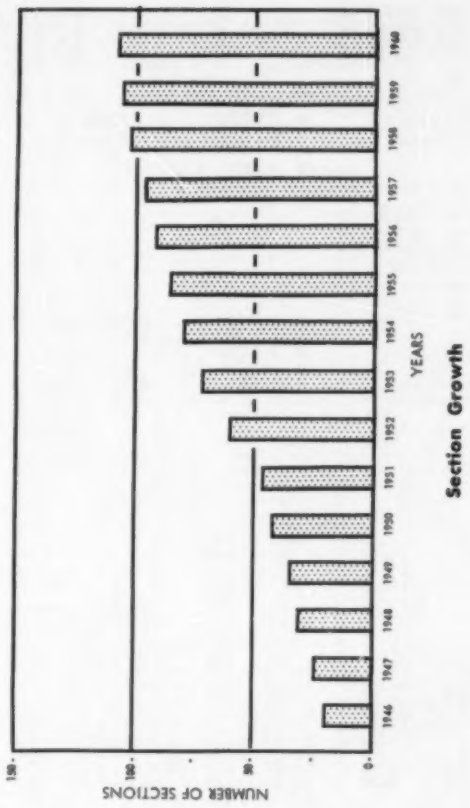
Since the total ballots cast on all above amendments exceeded

Exhibit B — Membership Report

Dist. & Code Nos.	Membership June 30, 1959	Membership June 30, 1960	Percent of June 30, 1959	Renewing Members	Percent Renewals	New Members	Percent New Members
0100 Boston	336	403	119.9	297	88.3	106	31.5
0101 Buzzards Bay	25	22	88.0	18	72.0	4	16.0
0103 Hartford	139	131	94.2	116	83.4	15	10.7
0104 New Hampshire	40	46	115.0	35	87.5	11	27.5
0105 New Haven	71	66	92.9	59	83.0	7	9.8
0106 Pittsfield	103	148	143.6	91	88.3	57	55.3
0107 Rhode Island	67	86	128.3	64	95.5	22	32.8
0108 So. Connecticut	138	136	98.5	117	84.7	19	13.7
0109 Western Mass.	59	62	105.0	55	93.2	7	11.8
0110 Worcester	63	62	98.4	56	88.8	6	9.5
DISTRICT 1 TOTALS	1041	1162	111.6	908	87.2	254	24.3
0200 Albany	86	87	101.1	76	88.3	11	12.7
0201 Buffalo	103	107	103.8	88	83.5	19	18.8
0202 Corning-Elmira	91	85	93.4	76	83.5	9	9.8
0203 Mid Hudson	126	117	92.8	102	80.9	15	11.9
0204 Rochester	147	159	108.1	133	90.4	26	17.6
0205 Binghamton	116	117	100.8	88	75.8	29	25.0
0206 Syracuse	122	147	120.4	110	90.1	37	30.3
0207 Utica	49	55	112.2	35	71.4	20	40.8
DISTRICT 2 TOTALS	840	874	104.0	708	84.2	166	19.7
0300 Metropolitan	818	888	108.5	724	88.5	164	20.0
0400 Hamilton	72	72	100.0	66	91.6	6	8.3
0401 Montreal	197	209	106.0	166	84.2	43	21.8
0402 Toronto	133	134	100.7	111	83.4	23	17.2
0403 Western Ont.	44	61	138.6	38	86.3	23	55.2
0404 Windsor	69	58	84.0	52	75.3	6	8.6
0405 St. Catharines	2						
DISTRICT 4 TOTALS	517	534	103.2	433	83.7	101	19.5
0500 Allentown-Beth.	117	147	125.6	97	82.9	50	42.7
0501 Danville-Sunb'y	32	29	90.6	23	71.8	6	18.7
0502 Erie	44	45	102.2	38	86.3	7	15.9
0503 Harrisburg	112	127	113.3	97	86.6	30	26.7
0504 Lansdale	47	40	85.1	33	70.2	7	14.8
0505 Philadelphia	286	319	111.5	251	87.7	68	23.7
0506 Pittsburgh	142	147	103.5	118	83.0	29	20.4
0507 Scranton-W.B.	40	42	105.0	35	87.5	7	17.5
0508 Trenton	37	33	89.1	29	78.3	4	10.8
DISTRICT 5 TOTALS	856	929	108.5	721	84.2	208	24.2
0600 Baltimore	131	144	109.9	119	90.8	25	19.0
0601 Piedmont	77	89	115.5	71	92.2	18	23.3
0602 Delaware	74	72	97.2	65	87.8	7	9.4
0603 Richmond, Va.	48	58	120.8	44	91.6	14	29.1
0604 Washington	122	122	100.0	100	81.9	22	18.0
0605 Cumberland	39	31	79.4	28	71.7	3	7.6
DISTRICT 6 TOTALS	491	516	105.0	427	86.9	89	18.1
0700 Cleveland	243	259	106.5	200	82.3	59	24.2
0800 Cincinnati	189	166	87.8	141	74.6	25	13.2
0801 Columbus	104	102	98.0	86	82.6	15	14.4
0802 Dayton	91	98	107.6	84	92.3	14	15.3
0803 Parkersburg	35	39	111.4	33	94.2	6	17.1
0804 Toledo	73	69	94.5	57	78.0	12	16.4
0805 Youngstown	48	66	137.5	41	85.4	25	52.0
0806 Charleston	73	69	94.5	55	75.3	14	19.1
0807 Hamilton-M'town	69	65	94.2	55	79.7	10	14.4
0808 Lima	73	124	169.8	57	78.0	67	91.7
0809 Lexington, Ky.	53	57	107.5	50	94.3	7	13.2
0810 Akron-Canton	128	122	95.3	102	79.6	20	15.6
DISTRICT 8 TOTALS	936	977	104.3	761	81.3	216	23.0

0900 Evansville-Owen.	55	49	89.0	42	76.3	7	12.7
0901 Grand Rapids	26	29	111.5	27	103.8	2	7.6
0902 Gr. Muskegon	46	50	108.6	43	93.4	7	15.2
0903 Indianapolis	172	165	95.9	142	82.5	23	13.3
0904 Muncie	28	31	110.7	25	89.2	6	21.4
0905 N.E. Indiana	48	46	95.8	39	81.2	7	14.5
0906 So. Bend-Mish.	87	91	104.5	66	75.8	25	28.7
0907 Richmond, Ind.	33	100	303.0	21	63.6	79	239.3
0908 Btl. Crk.-Kal.	50	58	116.0	49	98.0	9	18.0
DISTRICT 9 TOTALS	545	619	113.5	454	83.3	165	30.2
1000 Greater Detroit	498	487	97.7	407	81.7	80	16.0
1100 Chicago	514	488	94.9	396	77.0	92	17.8
1200 Central Ill.	36	34	94.4	31	86.1	3	8.3
1201 Iowa	119	121	101.6	105	88.2	16	13.4
1202 Milwaukee	202	202	100.0	174	86.1	28	13.8
1203 Minnesota	215	263	122.3	200	93.0	63	7.4
1204 Racine	35	41	117.1	31	88.5	10	28.5
1205 Rockford	48	44	91.6	38	79.1	6	12.5
1206 Winnebago	59	60	101.6	51	86.4	9	15.2
1207 Kankakee-Joliet	46	36	78.2	32	69.5	4	8.6
1208 St. Charles	64	102	159.3	60	93.7	42	65.6
1209 So. Illinois	42	43	102.3	42	100.0	1	2.3
DISTRICT 12 TOTALS	866	946	109.2	764	88.2	182	21.0
1300 Denver	45	57	126.6	39	86.6	18	40.0
1301 Kansas City	88	112	76.1	78	67.0	34	9.0
1302 Omaha-Lincoln	44	48	109.0	39	88.6	9	20.4
1303 St. Louis	104	139	133.6	73	70.1	66	63.4
1304 Wichita	86	66	73.2	59	91.3	7	8.1
1305 Tulsa	91	70	76.9	48	52.7	22	24.1
1306 Joplin	28	30	107.1	21	75.0	9	32.1
1307 Oklahoma City	10	66	660.0	10	100.0	56	560.0
DISTRICT 13 TOTALS	496	588	118.7	367	73.9	221	44.7
1400 Albuquerque	141	127	90.0	109	77.3	18	12.7
1401 Baton Rouge-N.O.	8						
1402 Dallas-Ft. Worth	206	217	105.3	149	72.3	68	33.0
1403 Mexico City	56	66	117.8	54	96.4	12	21.4
1404 San Antonio	37	30	81.0	27	72.9	3	8.1
1405 South Texas	97	97	100.0	81	83.5	16	16.4
1406 Waco	41	22	53.6	22	53.6		
DISTRICT 14 TOTALS	586	559	95.3	442	75.4	117	19.9
1500 Birmingham	28	29	103.5	26	92.8	3	10.7
1501 Chattanooga	31	30	96.7	27	87.0	3	9.6
1502 Georgia	55	54	98.1	48	87.2	6	10.9
1503 Huntsville	43	45	104.6	36	83.7	9	20.9
1504 Louisville	84	79	94.0	66	78.5	13	15.4
1505 Memphis	38	38	100.0	34	89.4	4	10.5
1506 Tennessee	32	33	103.1	28	87.5	5	15.6
1507 Pensacola-Mobile	70	68	97.1	53	75.7	15	21.4
1508 St. Pete.-Tampa	101	63	62.3	50	49.5	13	12.8
1509 Orlando-Cape Can.	57	52	91.2	46	80.7	6	10.5
1510 N.E. Tennessee	46	80	173.9	42	91.3	38	82.6
DISTRICT 15 TOTALS	585	571	97.6	456	77.9	115	19.6
1601 Los Angeles	374	478	127.8	333	89.0	145	38.7
1604 San Bernardino	134	148	110.4	105	78.3	43	32.0
1605 San Diego	163	152	93.2	126	77.3	26	15.9
1608 Tucson	33	45	136.3	32	96.9	13	39.3
1609 Phoenix	63	59	93.6	49	77.3	10	15.8
1603 Orange	43	100	232.5	46	106.9	54	55.8
1602 Santa Maria-Van.	6	27	450.0	5	100.0	21	350.0
DISTRICT 16 TOTALS	810	1,009	124.5	697	86.0	312	38.5
1700 Japan	70	67	95.7	63	90.0	4	5.7
1701 Portland	50	45	90.0	38	76.0	7	14.0
1702 Salt Lake City	43	44	102.3	33	76.7	11	25.5
1703 San Francisco	238	252	107.2	200	84.0	52	21.8
1704 Seattle	83	91	109.6	80	96.3	11	13.2
1705 Sacramento	62	66	106.4	56	90.3	10	16.1
DISTRICT 17 TOTALS	546	565	103.4	470	86.0	95	17.3
2500 Chapter #1	118	132	111.8	118	100.0	14	11.8
A.S.Q.C. TOTALS	11,312	12,103	107.0	9451	83.5	2652	23.4

Exhibit C



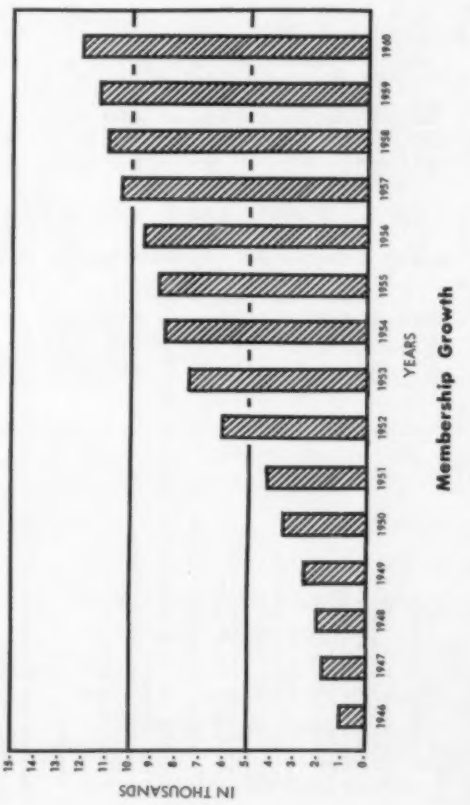


Exhibit D—Comparative Balance Sheets June 30, 1960 and June 30, 1959

ASSETS

	1960		1959	
Current Assets				
Office cash funds		$ 290.00		$ 558.90
Demand deposits:				
General operations	$29,686.28		$29,261.77	
Securities operations	1,137.44	30,823.72	1,966.08	31,227.85
Time deposits:				
General operations	$22,533.99		$11,601.88	
Brumbaugh Award Fund	2,175.22		2,198.78	
Shewhart Medal Fund	712.05		653.02	
Saddoris Award Fund			31.84	
Edwards Medal Fund	117.40	25,538.57		14,485.52
Accounts receivable		1,738.38		3,558.19
Interest accrued on securities		449.24		400.32
Advances and deposits		1,839.56		
Inventories at nominal amounts:				
Back issues and publications	$ 1.00		$ 1.00	
Stationery and supplies	1.00	2.00	1.00	2.00
TOTAL CURRENT ASSETS		$ 60,681.47		$ 50,232.78
Securities—at cost (quoted market value 1960—$122,334.45; 1959—$122,328.01)				
Fixed income:				
United States Treasury bonds	$23,016.98		$20,186.48	
Other bonds	29,643.74		29,313.84	
Preferred stocks	5,486.25		5,704.05	
	$58,140.97		$55,204.37	
Equities	44,144.33	102,285.30	43,872.21	99,076.58
Furniture and Equipment—at nominal amount		1.00		1.00
Deferred Charges		7,030.79		3,744.19
		$169,998.56		$153,054.55

LIABILITIES

	1960		1959	
Current Liabilities				
Accounts payable		$ 5,770.20		$ 9,763.98
Accrued salaries				265.62
Pay roll taxes and taxes withheld from employees		1,057.33		979.58
Sections allotment		13,059.00		8,008.00
Divisions dues		1,754.00		1,095.00
Excise taxes—prior years				1,012.36
TOTAL CURRENT LIABILITIES		$ 21,640.53		$ 21,124.54
Deferred Income				
Dues collected in advance	$40,464.00		$26,511.50	
Less sections allotment transferred to current liabilities	13,059.00		8,008.00	
	$27,405.00		$18,503.50	
Library subscriptions unearned	7,660.00		6,310.00	
Exhibit space rental unearned		35,065.00	340.00	25,153.50
Reserves				
For possible losses on securities			$ 5,000.00	
For Capital Equipment	$ 1.68			
For Education	3,300.00			
Brumbaugh Award Fund	2,175.22		2,198.78	
Shewhart Medal Fund	712.05		653.02	
Saddoris Award Fund			31.84	
Edwards Medal Fund	117.40	6,306.35		7,883.64
Net Worth		106,986.68		98,892.87
		$169,998.56		$153,054.55

Exhibit E—Statement of Changes in Reserves and Net Worth, Year Ended June 30, 1960

	Net Worth				Reserves						
	General Operations	Convention Operations	Securities Operations	Total	For Possible Losses on Securities	For Education	For Capital Equipment	Brumbaugh Award Fund	Shewhart Medal Fund	Saddoris Award Fund	Edwards Medal Fund
Balance at July 1, 1959	($4,084.09)	$8,533.98	$ 96,442.98	$ 98,892.87	$5,000.00	$ —0—	$ —0—	$2,198.78	$653.02	$ 31.84	$ —0—
Add:											
Excess of income over expense	4,660.42	489.39	2,429.00	7,578.81					59.03		
Provision charged to General Operations						900.00					
Reserve for possible losses on securities restored to Net Worth			5,000.00	5,000.00							
Transfer from General Operations						2,400.00				500.00	
Transfer from Convention Operations							1,585.00				
Transfer from Saddoris Award Fund											$429.38
	$ 576.33	$7,023.37	$103,871.98	$111,471.68	$5,000.00	$3,300.00	$1,585.00	$2,198.78	$712.05	$531.84	$429.38
Deduct:											
Excess of expense over income								$ 23.56		$102.46	$311.98
Capital equipment expenditures							$1,583.32				
Transfer to Saddoris Award Fund	$ 500.00			$ 500.00							
Transfer to Reserve for Education	2,400.00			2,400.00							
Transfer to Edwards Medal Fund										429.38	
Transfer to Reserve for Capital Equipment		$1,585.00		1,585.00							
Reserve restored to net worth of Securities Operations					$5,000.00						
	$2,900.00	$1,585.00		$ 4,485.00	$5,000.00		$1,583.32	$ 23.56		$531.84	$311.98
BALANCE AT JUNE 30, 1960	($2,323.67)	$5,438.37	$103,871.98	$106,986.68	$ —0—	$3,300.00	$ 1.68	$2,175.22	$712.05	$ —0—	$117.40

( ) Indicates deficiency in assets

the 25 percent minimum requirement and since both conditions of adoption were met, the committee declares the above amendments to be duly adopted.

The Tellers Committee — William A. Golomski, R. E. Boldt, Thomas Lucas, A. E. Jakel

May 24, 1960
San Francisco, Calif. — George I. Craycraft, *Chairman*

Report of the Treasurer

During the 1959-1960 fiscal year further improvements and refinements were made in your Society's accounting and bookkeeping procedures, some of which are outlined below:

Financial Procedures Manual

At the recommendation of the Auditing Committee, a Financial Procedures Manual is being prepared to insure continued use of accepted accounting practices, to facilitate the annual audit, and to provide a means whereby the officers and the Board of Directors of the Society, as well as other interested parties, can readily familiarize themselves with the Society's accounting procedures. The Annual Report and Budget Preparation sections of subject manual have been completed. Involvement with the San Francisco Convention and a heavy schedule has prevented completion of the balance of the manual as planned.

Direct Collection of Dues

Direct collection of dues coupled with an improved system and frequency of reporting membership renewals has provided better service to the sections, has permitted expedient follow-up on non-renewals, and has improved accounting, auditing and budgetary controls.

Monthly Financial Report

An annual budget is prepared and approved by the Executive Committee at the beginning of the fiscal year. A monthly Financial Report is prepared by the Milwaukee office which shows for each budget item, Actual vs Budget for the current month, for the year-to-date; the year-to date differences, and the differences expressed as "percent of Budget". This budget performance report provides valuable information for controlling expenditures and ascertaining our financial position on a month-to-month and on a year-to-date basis. This report is valuable not only as a means of fiscal control, but also provides valuable historical data for future budget preparation.

Annual Reports

This is the first year that Sections in addition to Divisions have been required to prepare an annual report. While most sections prepared these reports for their own use, they are now required by the Internal Revenue Service, for the Society to retain its tax position as a non-profit organization.

The operations for the year are presented in the following exhibits: Exhibit D, Comparative Balance Sheets; Exhibit E, Statement of Changes in Net Worth and Reserves; Exhibit F, Statement of Income and Expenses; Exhibit G, Award Funds—Statement of Income & Expenses; Exhibit H graphically presents the per capita income and expenses reported in Exhibit F. Assets of the Divisions as reported by their respective treasurer's at June 30, 1960 are as follows: Administrative Applications $4,665.89, Aircraft and Missile $3,406.93, Automotive $2,007.79, Chemical $8,809.72, Electronics $7,277.49 and Textile $2,939.36.

San Francisco, California — Allan M. Hull
June 30, 1960 — Treasurer

Exhibit F—STATEMENT OF INCOME AND EXPENSE
Year Ended June 30, 1960

General Operations:		
Income:		
Membership dues	$144,379.00	
Publications	51,878.85	
Services	4,079.38	
Workshop seminar	10,000.00	
Miscellaneous	1,346.08	$211,683.31
Operating expenses:		
Publications:		
Printing, mailing, and engraving costs—magazine	$ 45,108.14	
Printing costs—other	4,162.68	
Salaries	20,643.98	
Advertising	6,698.92	
Administrative and sundry	5,267.40	
Printing and mailing—membership roster	3,214.58	
	$ 85,095.70	
Workshop seminar expenses	$ 9,209.67	
Provision for Reserve for Education	$ 900.00	
Executive group expenses	$ 1,525.55	
Executive secretary:		
Salaries	$ 26,786.49	
Pay roll taxes	1,273.24	
Records and services	6,196.42	
Rent and light	3,522.27	
Travel	1,834.43	
Equipment and equipment maintenance	799.16	
Printing	7,280.71	
Administrative and sundry	7,801.63	
	$ 55,494.35	
Section allotments	$ 44,124.00	
Chapter appropriation	$ 421.80	
Treasurer:		
Salaries	$ 7,821.85	
Legal and other professional	1,125.00	
Insurance	976.93	
Sundry	328.04	
	10,251.82	207,022.89
EXCESS OF INCOME OVER EXPENSE—GENERAL OPERATIONS		$ 4,660.42
Convention Operations:		
Income:		
Registration fees	$ 16,685.00	
Exhibit booth sales	8,625.00	
Transactions sales	6,861.18	
Miscellaneous	1,966.59	$ 34,137.77
Expense:		
Luncheons and banquets	$ 3,424.63	
Publicity and promotion	5,902.62	
Technical program	2,717.51	
Exhibit expense	3,619.61	
Transactions	2,581.84	
Social program	2,396.41	
General administrative:		
Convention operations $7,306.63		
Exhibit operations 5,699.13	13,005.76	33,648.38
EXCESS OF INCOME OVER EXPENSE—CONVENTION OPERATIONS		$ 489.39
Securities Operations:		
Income:		
Interest earned	$ 1,862.49	
Dividends received	2,258.51	$ 4,121.00
Expense:		
Loss on sale of securities	$ 830.68	
Legal and other professional	250.00	
Investment advisory service	611.32	1,692.00
EXCESS OF INCOME OVER EXPENSE—SECURITIES OPERATIONS		$ 2,429.00
EXCESS OF INCOME OVER EXPENSE—COMBINED OPERATIONS		$ 7,578.81

Accountants' Report

Audit Committee,
American Society for Quality Control, Inc.,
Milwaukee, Wisconsin.

We have examined the financial statements of American Society for Quality Control, Inc. for the year ended June 30, 1960. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and statements of income and expense and changes in reserves and net worth present fairly the financial position of American Society for Quality Control, Inc. at June 30, 1960, and the results of its operations for the year when ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Ernst & Ernst

Milwaukee, Wisconsin,
August 5, 1960. — *Certified Public Accountants*

Certification of Auditing Committee

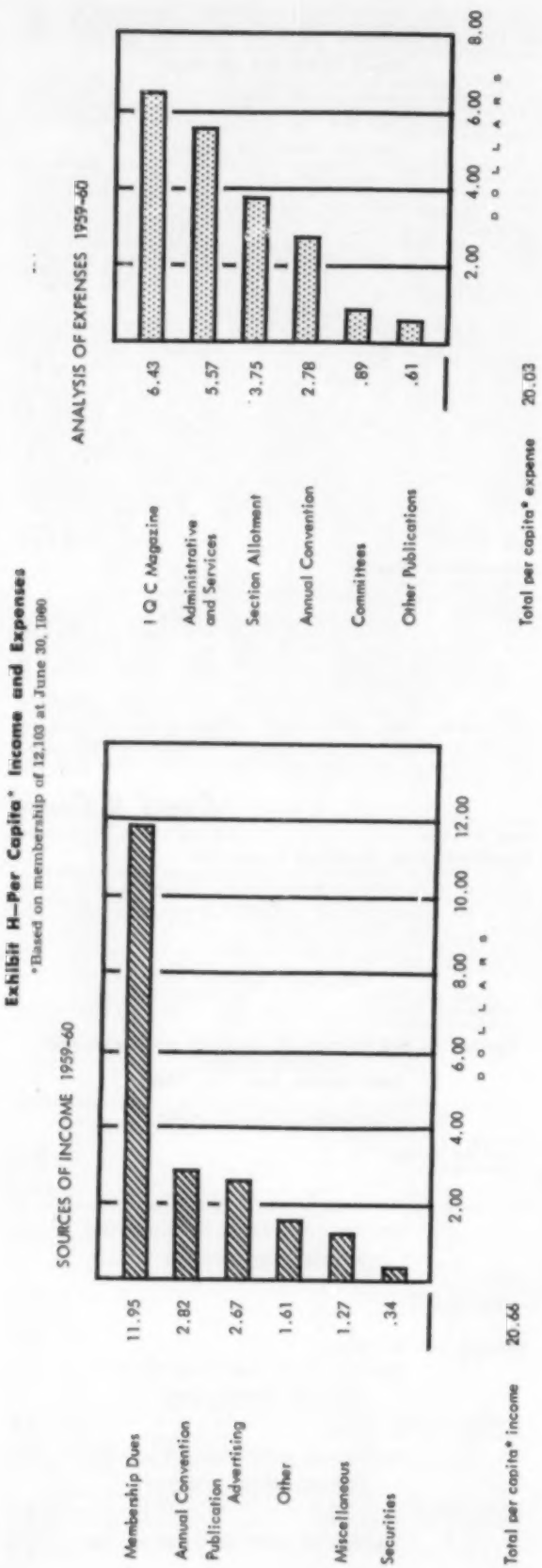
Ernst & Ernst, Certified Public Accountants, were retained to audit the books of the American Society for Quality Control, Inc. Relying on this audit and the certification of Ernst & Ernst, we are of the opinion that the accompanying Balance Sheets, Statements of Income and Expense, and Changes in Reserves and Net Worth fairly present the financial position of the Society as of June 30, 1960, and its financial transactions for the fiscal year ending that date.

Auditing Committee

Howard R. Bolton, H. George Thompson, Elbert T. Magruder, Paul A. Robert, *Chairman*, Blair Olmstead

Exhibit G—STATEMENT OF INCOME AND EXPENSE—AWARD FUNDS
Year Ended June 30, 1960

BRUMBAUGH AWARD FUND	
Income:	
Interest earned	$ 66.44
Contribution	50.00
	$ 116.44
Expense (including $50.00 cash award to J. Stuart Hunter)	140.00
EXCESS OF EXPENSE OVER INCOME	$ 23.56
SHEWHART MEDAL FUND	
Income:	
Interest earned	$ 19.67
Contribution	125.00
	$ 144.67
Expense—cost of medals	85.64
EXCESS OF INCOME OVER EXPENSE	$ 59.03
SADDORIS AWARD FUND	
Income—interest earned	$ 9.27
Expense—cost of awards	111.73
EXCESS OF EXPENSE OVER INCOME	$ 102.46
EDWARDS MEDAL FUND	
Income—contributions	$2,079.00
Expense—cost of medals	2,390.98
EXCESS OF EXPENSE OVER INCOME	$ 311.98



Report of the Editorial Board

It is the function of the Editorial Board to have operating supervision of *Industrial Quality Control* and all other technical publications of the Society.

Data on Volume XVI

The twelve issues of Volume XVI consisted of 520 pages plus 48 cover pages. Of the 520 pages available for editorial copy, 410, or about 79 percent were used for this purpose; the remaining 21 percent were paid ads. Of the 48 cover pages, 36 were for paid ads, 12 for front covers.

In these twelve issues a total of 41 contributed papers were published, averaging 4.1 pages per paper and ranging from 1.25 to 10 pages in length. Percentagewise these 410 pages were distributed as follows:

1. Contributed papers	41.0 %
2. Section, Division, Personal News Items	24.0
3. Departmental Copy	11.0
4. Miscellaneous (Masthead and Contents pages, Editorials, ASQC Convention and other Publicity, Stock Lists, Annual Reports, etc.)	24.0
	100.0 %

Contributed papers can be classified as follows:

1. General Applications of SQC Methods	6
2. Special Applications of SQC Methods	5
3. General Interest	18
4. Technical	9

General Publications

No contributions to this series were published during Volume XVI.

Five Year Cumulative Index for IQC

A Cumulative Index for Vols. XI-XV of IQC was published in May 1960. This Index is set up to cover material in these five volumes of IQC in the manner embodied in the ASQC Literature Classification System described in the Sept. 1959 issue of IQC. A subcommittee of the Editorial Board went through Vols. XI-XV and two independent LCS codings were supplied by members of this subcommittee for each item to be included in the Index. Resolution of conflicts were handled through the office of Editorial Chairman. Richard M. Jacobs collated the final data and prepared the copy for publication.

LCS Coding of Items in IQC

Beginning with the July 1959 issue, LCS codings were supplied in the Table of Contents for relevant items published in each issue. Starting with the September 1959 issue, the LCS coding was also printed on the title page of each item covered by the code as well as appearing in the Table of Contents.

Editorial Board Changes

The following persons have accepted appointment to the Editorial Board for a five-year term beginning July 1, 1960:

Lloyd A. Knowler, The State University of Iowa
Gerald J. Lieberman, Stanford University
Richard S. Bingham, Jr., The Carborundum Co.

The three men retiring from the Board as of June 30, 1960 are:

Albert A. Bowker, Stanford University
A. C. Cohen, Jr., University of Georgia
Edward M. Schrock, American Radiator and Standard Sanitary Corp.

Acknowledgement

Grateful acknowledgement is due the following persons for editorial assistance in reviewing manuscripts in cooperation with the Editorial Board:

Douglas H. W. Allan	Fred C. Leone
Richard S. Bingham, Jr.	Alfred Lieberman
Martin A. Brumbaugh	Gerald J. Lieberman
Thomas A. Budne	J. Y. McClure
Paul C. Clifford	Edwin G. Olds
Fred G. Fender	Paul S. Olmstead
Leroy Folks	Roger S. Pinkham
Richard A. Freund	Robert Schin
Frank M. Gryna, Jr.	Stanley B. Sherwood
Dame S. Hamby	M. R. Seldon
Ralph D. Humphries	Julian H. Toulouse
Richard M. Jacobs	Mack Usher
Truman L. Koehler	Roger Wilkinson
Lloyd A. Knowler	Albert W. Wortham

The Editorial Board and the Society also acknowledge appreciation to the Department Editors who are serving our journal in the maintenance of departmental activity. The roster of this important part of the editorial staff is regularly listed on the Table of Contents page in each issue of the Journal.

Resignation of Editorial Chairman

The Editorial Chairman, Dr. Mason E. Wescott, submitted his resignation to the Board of Directors at its meeting in San Francisco on May 24, 1960, asking that it become effective not later than June 30, 1961.

The resignation was prompted by

(1) The fact that the ASQC Constitution provides no stated length of service for the office of Editorial Chairman;

(2) the fact that the present incumbent has been continuously in office since July 1, 1947; and

(3) the fact that increasing responsibilities and approaching mandatory retirement in the academic post held by Dr. Wescott point to the present as the time in the best interests of both the Society and the individual to effect a change in the office of Editorial Chairman.

After a review of the circumstances, the resignation was reluctantly accepted by the Board. A unanimous expression of appreciation was voiced by the Board. Dr. Wescott was invited to assist the Board in naming his successor.

June 30, 1960
New Brunswick, N.J.

For the Editorial Board
Mason E. Wescott
Chairman

with this NEW Cadillac Bore Set PLA-CHEK

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section briefs

AKRON-CANTON . . . Officers and chairmen met Aug. 18 to review final arrangements for this year's program. Norton Miller of Goodyear Tire and Rubber and Thomas Sharkey of the University of Akron will co-chairman next year's conference committee.

All members are urged to issue a special invitation to their bosses and other interested management personnel to attend our annual Management Night dinner meeting Nov. 17. Edward M. Schrock, American Radiator and Standard Sanitary and a member of the Editorial Board of *Industrial Quality Control*, will discuss "Modern Inspection."

H. P. Pierce

ALBANY . . . Our educational committee has been very active with a 15 session course in "Fundamentals of Statistical Methods," which is being conducted by R. J. Tassini, General Engineering Laboratory, General Electric Co., Schenectady, N. Y. Specialized courses in techniques of statistical analysis and statistical quality control are planned for the spring of 1961.

M. P. Flanagan

ALBUQUERQUE . . . A dinner meeting at Kirtland AFB Officers' Open Mess opened our section year. After a short business meeting, the featured guest speaker, Dr. Irving Burr, Purdue University, presented an informative talk on "Steps Toward More Effective Customer Feed Back." Dr. Burr discussed the producer benefits that can be derived by proper acknowledgment and corrective action of customer complaints, and management's interest in establishing administrative channels to get the complaints to personnel who can evaluate the significance of the complaints and who have the authority to take corrective action. The talk was followed by a brief question and answer period.

A. E. Clamp

BATTLE CREEK-KALAMAZOO . . . An executive committee meeting was held Aug. 4 at the home of secretary Ralph Anderson in Marshall, Mich. Plans for our fall course were completed, thanks to Charles Beazley, our education chairman. Also a proposed Spring Forum was discussed. A new "Promotion Committee" was formed with George Church as chairman.

Peter F. Koets

BIRMINGHAM . . . The planning committee met in early August and completed plans for 1960-61 section meetings.

A. E. Raeuber

BOSTON . . . The education committee with Bob Fabian as chairman has completed the 1960-61 program. The first lecture series will be opened Oct. 3 at the American Mutual Insurance Co., Route 128, Wakefield, Mass. This series of five sessions will be conducted by Dorian Shainin, Rath & Strong, Inc., on "Practical Product Reliability Practices."

A brochure is being prepared under the guidance of Shant Chebookjian. It will group members by firm and industry and will have the complete program for the 1960-61 season.

H. L. Keefe

CINCINNATI . . . Section officers and committee chairmen of the Cincinnati and Hamilton-Middletown sections discussed education planning, program planning, and January Conference planning during a joint meeting Aug. 31 at Thompson Park.

Burr Stanton, General Electric Co., Louisville, Ky., will present "Selling QC to the Factory," at the Nov. 16 technical meeting.

Jack Eckles

CHICAGO . . . Much of our success as one of the first, most active and largest sections of the American Society for Quality Control can be directly traced to the wise leadership and faithful service of a few outstanding persons.

As an expression of gratitude and respect to one such individual, the Chicago section has instituted an annual award which will honor a man whose many valuable

Howard L. Jones, past chairman of the Chicago ASQC section, presents the section's Joe Lisy Award to Charles Matz, senior engineer, Commonwealth Edison Co.

contributions to section management were characterized by humility, an eye to economy, and a wonderful friendly manner—Joe Lisy.

His name, it was felt at the time of Joe's passing, would symbolize unselfish effort, unsparingly contributed towards improving and strengthening our section. What better beginning could have been made than to bestow the first of these awards to a good friend and most capable teacher and practicioner of statistical quality control—Charles Matz, senior engineer, Commonwealth Edison Co.

Mr. Matz was presented the award during the May 18 section meeting.

John Dittrich

CLEVELAND . . . During its pre-season meeting on Aug. 10, the executive committee voted to have two educational programs this fall and spring. Courses will be held in conjunction with Western Reserve University. Fall courses, "Fundamentals of Quality Control" and "Analysis of Variance," were opened Oct. 4.

Lloyd S. Nelson, Conference Chairman, outlined final details of the Nov. 18, All Day Conference on Quality Control and Reliability. There will be 12 speakers with three concurrent sessions on reliability, quality control, and experimental design. It is anticipated that more than 200 persons will attend.

The Annual Ladies Night will be held Dec. 2. Miss Mavis Carroll, General Foods Corp., will explain why "Factorials are Good to Eat."

Howard O. Schmidt

COLUMBUS . . . On Nov. 16 the section will hear J. N. Linneroth describe QC in the Tape Division of Minnesota Mining and Manufacturing. This talk has been presented to other groups in the Columbus area, and was highly recommended for scheduling by our section.

The section is sponsoring an advanced training course on Analysis of Variance. The six week course was opened Oct. 4 and was continued on Tuesday nights through Nov. 8 at the Timken Roller Bearing Co.

G. E. Arris

EVANSVILLE-OWENSBORO . . . On Aug. 30, the executive committee met at the Oaks in Evansville. The membership committee made plans to contact area QC personnel, inviting all non-members to attend our first meeting Sept. 20. Each member will be asked to introduce a new member during the current season.

It was decided to invite the wives of the membership to attend our two scheduled plant tours.

Ed Stiles, QC manager, Bucyrus Erie, Evansville, will host a plant tour Nov. 15. Since he transferred to our

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section last year, he has been one of our most active members. He is also on the speakers list for a program early in 1961.

Wane Ver Wayne

HAMILTON-MIDDLETOWN . . . The meeting Nov. 2 will be Management Night and each member is urged to bring his boss as a guest. Mr. Partridge will present his "Simulation Model for Salary Movement." This is a mathematical model which is computer programmed, and serves to predict the effect of particular environments upon salary movement.

Mr. Partridge has degrees from Boston and Columbia Universities in Industrial Management and is a member of the Institute of Management Sciences. Prior to joining General Electric, he was project engineer with Otis Elevator Co. He is currently in operational analysis at General Electric Co. With him will be Gerald Weiss, manager of program plans and measurements, ANPD, and Keith Lewis, ASQC District 8 representative.

On Aug. 31, an executive committee meeting was held in Thompson Park in Hamilton, for the discussion of the current season program. Guests included the executive committee of the Cincinnati section and the wives of both committees. Refreshments were served after the business meeting.

Lon Ely

HAMILTON . . . The Fourth Annual QC Forum will be held at McMaster University Nov. 5. This forum is sponsored jointly by the University of Western Ontario and Hamilton sections. There will be 4, yes four, sessions running simultaneously during the day.

Speakers include Dr. C. H. Baker, K. J. Cook, H. L. Freeman, C. M. Miller, G. J. Levenbach, W. Hodgson, S. P. Zobel, W. Tate, F. Witske, and K. Nelson. Also included will be an all day basic QC course.

I. H. Murray

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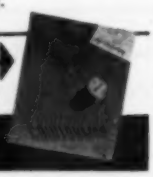

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HARRISBURG . . . The executive committee met Aug. 9 at the Hamilton Watch Co., Lancaster, Pa.

The education committee has sent flyers offering three QC courses to members and non-members.

The first pre-meeting clinic will be held in November.

The program and arrangements committees report that 80 percent of the meetings and locations for the next season have been scheduled, with the balance to be slated by September.

Members are urged to renew their membership to keep the section in good standing in the Saddoris Award competition.

The meeting Dec. 2 will be a Buzz session with Michael O'Hanlon, section member with AMP, Inc., Carlisle, Pa., as the leader. Mathematics instructors and teachers will be invited to attend and bring one of their students who is interested in statistics as section guests. All colleges and high schools in the area will be sent material and information concerning this meeting.

Ann Englehart

HARTFORD . . . On Nov. 1, members of the Hartford section will have an opportunity to see how jet engines and rocket engines are fabricated. After the tour of the manufacturing departments of Pratt & Whitney Aircraft at East Hartford, Lawrence Sespaniak, supervisor of operations research, will speak on "An Application of Queuing Theory for Measuring Performance of Test Crib Inspectors." Mr. Sespaniak will also talk briefly on the PWA industrial engineering IBM 702 computer program for determining inspection time standards.

J. Stewart Broatch of Pratt & Whitney Co., West Hartford, will speak on "An A to Z Application of Automatic Gaging," at the meeting Nov. 15 at the Nutmeggar House in Newington.

The regular monthly executive committee meeting was held Aug. 23 at the home of Eugene Ellis in Ghastonbury.

Lawrence Sespaniak

INDIANAPOLIS . . . On Sept. 20, the section opened the 1960-61, season. C. G. Bauer, QC director, Chrysler Corp., Detroit, Mich., completed the event—a plant tour and dinner at the Chrysler plant, Indianapolis—with the presentation "The Value of Quality Audits."

Oct. 11 brings out a joint session with the American Statistical Association for "The Significance of Difference for Attributes," by Dr. Irving W. Burr, professor of mathematics and statistics, Purdue University, Lafayette, Ind.

Nov. 8, John Waldner, Eli Lilly and Co., will present "Experimental Designs for Pharmaceutical Development."

K. E. Mullen

KANSAS CITY . . . An executive committee dinner meeting was held Aug. 18. A new and better location with improved facilities, as well as excellent food, contributed to an excellent planning session. Additional committee chairmen were appointed. Three new committees were established, including a Technical Society Liaison Committee. We feel that a closer tie with other technical and professional societies will be of benefit to all concerned. Committee responsibilities were outlined and discussed and programs for the next several months were presented.

H. Afton Taylor

LIMA . . . Twenty members and families were present for the Lima section's picnic, held at Ada Park Aug. 14, even though the weather was threatening.

The Lima section of the American Technical Council will join the Lima ASQC section for a joint dinner meeting Nov. 8, at the Lima Engine Plant, Ford Motor Co. Speaker for the dinner meeting will be I. A. DeGrote, manager of analysis and inspection standards department, Engine & Foundry division, Ford Motor Co. Following the dinner meeting a plant tour will

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be conducted, pointing to the QC functions in the Lima Engine Plant.

E. K. Anderson

MID HUDSON . . . During August the various committees made final plans to undertake the one day Seminar, which was held at Vassar College Sept. 17.

The first meeting of the season will be a panel discussion, "Why Quality Engineering?" Panel members are F. J. Sindelar, QC manager, IBM, Poughkeepsie, N. Y.; W. Penrose, manager, IBM, Kingston, and W. M. Cranston, QC manager, Western Printing Corp., Poughkeepsie, N. Y. They will discuss various philosophies relative to quality engineering's functions.

The December meeting will be a joint meeting of the technical societies of this area with the Mid Hudson section as guest. Jerome Barnum, president of Jerome Barnum Associates, Inc., management consultants, will be guest speaker. Mr. Barnum's topic will be "How to Sell Your Ideas." Efforts are being made to have each society encourage a large attendance of members and guests.

E. L. Leadbitter

MILWAUKEE . . . All committee chairmen have been appointed and are feverishly pursuing their individual activities. Committee chairmen are arrangement — Ed Harry, Bucyrus Erie Co.; auditing—Robert Harig, Stroh Die Casting; clinic—John Melchior, Miller Brewing Co.; education and training—Robert Brundle, Larry Hammond Co.; membership — Edward Hardebeck, A. O. Smith Corp.; professionalism—David Atchley, Line Material Industries; program—Arnold E. Jakel, QC consultant; and publicity—William Donlevy, Froedtert Malt Corp.

Darrell G. Schroeder

MINNESOTA . . . The first executive committee meeting of the year at Bill Beck's home Aug. 29 found all committees in full swing and the promise of a mighty interesting year.

Kenneth Sundeen, education chairman, announced Oct. 4 as the beginning date for our fundamentals course with Ron Arneberg, Minneapolis Honeywell, as instructor, and Oct. 6 as first advance course meeting.

Bill Brown, program chairman, will visit the Ford plant prior to our tour to complete arrangements and with hopes of selling ASQC membership.

Vida Grace Hildyard, clinic chairman, set Feb. 14, Hotel Lowry, St. Paul, Minn., for our one day clinic. Her speakers and program are shaping up nicely.

Ideas for a permanent meeting place were discussed. It is felt that our own quarters would do much to increase regular meeting attendance and make the group feel more closely knit.

Violet M. Rice

MONTREAL . . . B. H. Lloyd, Price Waterhouse & Co., Montreal, will speak Nov. 9 at the Ecole Polytechnique. Mr. Lloyd is a well known speaker on QC topics and has had many years experience in this field with his present company as well as Canadian Industries Ltd. He is a graduate of the University of Toronto. His talk is entitled "An Interview on Quality Control."

Professor David Arthurs of Sir George Williams University will speak on "Possible Solutions for Some Problems in Communication," at the monthly meeting on Wednesday, Dec. 7, in the Canadian Industries Bldg. Professor Arthurs is a lecturer in science and general semantics at the University and has spoken to several groups on this subject. He has obtained degrees as a Master of Arts and a Bachelor of Pedology.

T. F. Waterston

MUNCIE . . . Our Muncie section night dinner meeting will be held in the pine shelf room, student center, Ball State Teachers College, Nov. 11. The subject, "Organization and Company Approach to Quality Control," will be presented by section members Robert Yingst, Glasco Corp.; William McHenry, Albion Malleable Co., and Richard Sowastsky, Chevrolet-Muncie Division of GMC. All members of this panel are quality control supervisors.

C. B. Johnson

NORTHEAST TENNESSEE . . . Section activity is rapidly increasing as plans are being completed for the coming season. The board of directors and the executive committee met in Kingsport Aug. 29 to discuss details concerning the year's general membership programs, the training and educational programs, and the evaluation of the program for accumulating Saddoris Award points.

A pamphlet outlining the year's programs, including panel discussions and courses, has been mailed to all members and interested parties in East Tennessee. Especially noteworthy in the coming year's programs are the courses to be presented in the early evening at each meeting night. Two courses are planned: "Quality Control Management," four meetings, and "Quality Control Application," four meetings.

All officers and members have been requested by the section chairman to exert every effort to make each event on the annual program a success.

M. Gomez

ORANGE EMPIRE . . . Our plant tour of the Hughes Semiconductor Division in Newport Beach, Calif., was a tremendous success. A turnout of almost 200 members and guests arrived by 7 p.m. to take the two hour tour.

The guides were very well versed as to the procedures, processing and testing of the product. All questions were answered, and the tour proved to be very enlightening.

The tour was concluded with coffee and cake.

We are deeply grateful to the management and personnel of the Hughes Semiconductor Division that made this tour possible and such a tremendous success.

Peter J. Graham

PARKERSBURG . . . The August executive meeting was held on the first. This was the first meeting after

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Professional Development Note

Paul A. Robert

Paul A. Robert, past president of ASQC, has been elected president of the KDI Corp.

He succeeds Walter J. Niles, who became chairman of the executive committee.

Mr. Robert came to Cincinnati in 1955 from IBM, Endicott, N.Y., to join the Gruen Watch Co. He was general manager of their plant in Norwood and when the Precision Products Division was sold to KDI Corporation in 1957, he continued in that capacity.

In March of this year he was made vice-president and elected to the Board of Directors.

The company manufactures small and miniature precision parts and assemblies employed in mechanical timing mechanisms. They also do subcontracting for manufacturers of office equipment, time recording and signalling devices and miniature hydraulic devices.

George O. Cutter

George O. Cutter, director of manufacturing, has been appointed a vice president of the Gillette Safety Razor Co.

He joined Gillette as a quality control engineer in 1948, and thereafter served in a succession of key manufacturing posts, including chief inspector of the razor division, assistant to the vice president in charge of manufacturing, and assistant quality superintendent.

In 1952 he was put in charge of manufacturing operations at Gillette of Canada Ltd.'s plant in Montreal. Two years later he returned to Boston as superintendent of the blade division and in 1957 he was named operations manager for the company's manufacturing division.

He has been director of manufacturing since September 1959.

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For whom is the program planned? For present and prospective Quality Managers. It is expected that the applicant will have reasonable familiarity with such standard texts as Grant, Feigenbaum, and Juran. To benefit properly from the seminar, the applicant should have a minimum of several years experience with major responsibility for quality.

Registrants will be sent study materials and case studies prior to the conference. Registration is limited to 75 persons and is complete only on receipt of the registration fee of $125 for non-members, $100 for members, which includes the cost of three lunches.

Your Registration will be acknowledged. A room reservation card for the Penn Sheraton Hotel will be enclosed with the acknowledgment.

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Paul C. Clifford, Director

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NOTE: Additional registrations may be made by attaching a list to this coupon. Please include necessary information for each registrant.

vacations and great things are anticipated for this section during the coming year.

The regular executive committee meeting for November will be held on the first Monday. Place and time to be announced.

Robert R. Stewart

PENSACOLA . . . Joseph R. Martin will conduct a tour of the Chemstrand Corporation for all members and guests Nov. 10. Mr. Martin, QC supervisor at Chemstrand, has planned to highlight the meeting with a detailed tour through the nylon plant. Chemstrand is one of the nation's leading producers of nylon and a first-hand look at the processes and equipment in the plant should be most interesting.

Dinner at the plant picnic grounds will follow the tour. Nylon is a fiber with special appeal to the feminine gender; therefore, we are declaring our November meeting as Ladies' Night and all the wives and girl friends of our members and their guests are invited to attend.

Walter D. Nencka

PHILADELPHIA . . . The successful program policy of the past season will be continued this season. For the benefit of new members, the program will be highlighted by a talk by a prominent executive at the dinner portion of the meeting. After dinner, two informal technical sessions will be run concurrently.

For the Nov. 17 meeting, technical sessions will be "Quality Assurance Procedures in the US Army Signal Supply Agency," presented by Arnold K. Dodds, Jr., of ASSA, and "Every Day Problems in Quality Control," presented by Reginald Johnson of Johnson & Johnson, New Brunswick, N. J.

Albert G. Dettore

PITTSBURGH . . . It seems that most of the members of the Pittsburgh section took their vacations in August. Since they did, there were no meetings during that month. However, individual members were working feverishly to coordinate, print and distribute the coming calendar of events.

In looking over the calendar for the year, it is noteworthy that a joint meeting with the ASA is scheduled for early December. We are looking forward to this meeting because of common interests between the two groups.

Chester R. Smith

PITTSFIELD . . . An executive committee meeting was held Aug. 24 at the Stanley Club in Pittsfield to complete final arrangements for the 1960-61 program. It was the general feeling that this will be our best year.

A letter of thanks has been received from C. E. Fisher for the section's contribution to the Edwards Medal and Shewhart Medal funds.

The Pittsfield section is formulating a new attendance card for the coming year. The final draft has been adopted and sent to press.

Howard J. Greenslet

PORTLAND . . . The executive board met at the Omark Industries recreation room on Aug. 23. Casey Hoekstra, membership chairman, discussed the program of his committee.

A "Management Games" program is planned for the near future. Henry Blood, Ray Vanderzanden, George Mickel, Bob McDonald and James Abell will serve as referees.

George Mickel

ROCHESTER . . . The November dinner meeting will be attended by the parent group and the gage and measurement subgroup.

The food and allied industries sub-group will meet Nov. 7. The technical subgroup will meet Dec. 6.

A. D. Rickmers

ST. CHARLES . . . The Annual All Day Management Seminar was held at the Elmhurst Country Club Aug. 25. Forty plant managers and QC personnel were present to hear Dr. Richard Wallen, a consultant for Personnel Research and Development Corp., speak on "Effective Communication."

Dr. Wallen presented a very enjoyable morning session. Judging from the comments, he was hitting areas of weakness in many of our own companies.

He demonstrated the value of two way communication, such as the telephone, as opposed to one way communication, such as the memo.

Frank L. Osborne, operations manager, Montgomery plant, Western Electric, spoke on "Quality Control as a Competitive Weapon."

Samuel L. Corell, quality assurance manager, germanium products, Diversa Electronics, Dallas, Tex., spoke on "A Customer Oriented Quality Assurance Program."

E. Ellis Elder

Dr. Richard W. Wallen, left, consultant for Personnel Research and Development Corp., discusses the Management Seminar program with Albert Stoltz, right, chairman of the St. Charles ASQC section.

L.A. Reliability Symposium

The Second Annual Reliability Symposium sponsored by the Los Angeles ASQC section will be held Feb. 22 at the Statler-Hilton Hotel, Los Angeles, Calif.

Speakers for the morning sessions will include Dr. A. V. Feigenbaum, General Electric Co., New York City, and a Military Panel conducted by John J. Riordan, office of the Assistant Secretary of Defense, Supply and Logistics, Washington 25, D.C.

Robert O. Sprague, Hughes Aircraft Co., Tucson, Ariz., has been scheduled as the luncheon speaker.

Afternoon sessions will be given by Dr. R. M. Ashby, Autonetics, Dr. W. Mendenhall, Bucknell, and a panel with the speakers for the day.

Moderators will include Dr. Edward P. Coleman, UCLA, and Prof. W. Grant Ireson, Stanford University, Palo Alto, Calif.

For additional information contact Jack Lancaster, AMC Ballistic Missile Center (LBPQ) AF Unit Post Office, Los Angeles 45, Calif. Telephone ORchard 0-1444, Ext. 1153, or Steve Kozich, American Electronics, 1598 East Ross Ave., Fullerton, Calif. Telephone TRojan 1-3020 or MAdison 5-7192.

The Conference Transaction will be printed and copies can be reserved by writing to Arnold Rothstein, Space Technology Laboratories, 5800 Arbor Vitae, Los Angeles 45, Calif. Telephone SPring 6-1311, Ext. 1002.

ST. LOUIS . . . Almost all ASQC members have heard of the Saddoris Award, but most of us know very little about it. The St. Louis section hopes to change this situation at the workshop preceding its November meeting. At that time, our Saddoris Award chairman, S. H. Huston, will present an explanation of the rating system.

W. W. Paris

ST. PETERSBURG-TAMPA . . . Among coming events is a guided tour of the Joseph Schlitz Brewing Co., Tampa, Florida.

H. L. Goldberg

SAN DIEGO . . . November 14 will be feminine pulchritude night in San Diego, i.e., Ladies Night.

The occasion will feature as its guest speaker Mrs. Helen E. Nelson, Consumer Counsel Governor's Office, State of California.

Her topic will be "Quality Characteristics and Clues for Purchasing Clothing, Furniture and Household Items." We are sure the subject is close to the hearts of our females and close to the pocketbooks of our males.

This section's members as well as guests are anticipating an enlightening, entertaining and memorable evening.

L. I. Fredrickson

SAN FRANCISCO . . . The section started the fall program series with a trip through the Owens-Illinois Glass Company plant in Oakland, Calif. This is said to be the largest glass container plant in the West. The section was given the opportunity to study quality control of raw material through finished product along the entire group of production lines.

During the first meeting of the executive committee, the program for the coming year was announced. Two special panel discussions are planned for the December and May meetings.

C. G. Parkin of the Minnesota Mining and Manufacturing Company will be on hand at the November meeting to discuss forecasting techniques.

M. R. Hubbard

TOLEDO . . . The meeting Nov. 3 has been arranged with a dinner at the Engineering Society of Toledo club rooms, 4638 Lewis Ave., Toledo, to be followed by a panel discussion.

The panel will consist of D. E. Richardson, plant manager; Edward Dow, production engineer, and Paul Atwell, product manager, all of the Electric Autolite Co., Spark Plug Division, Fostoria, Ohio. The Panel moderator will be Fred D. Reardon, a past chairman of the Toledo section and plant superintendent of the Fostoria Autolite plant. The topic will be "Quality Control in Manufacturing from the View Point of the Plant Manager, Production Engineer and Field Engineer."

All of these men are putting forth a lot of work to prepare for this meeting and it is hoped that each member will attempt to bring at least one interested guest.

Carwin L. Elwick

TORONTO . . . I wish to draw to the attention of Toronto section members the change of our meeting place to the Canadian General Electric Auditorium, 214 King St., W. Toronto.

Charles S. Argyle, Long Manufacturing Co. Ltd., Oakville, Ontario, Canada, will be chairman of a study group at the Meeting Nov. 23. The topic — Control of Raw Materials on Receiving Inspection of Diverse Industries.

G. E. Culver

UTICA . . . On Aug. 18, plans for the coming season were completed during an executive committee meeting at the Hotel Hamilton.

D. F. Yeaton

WESTERN MASSACHUSETTS . . . On Tuesday evening, Nov. 8, A. P. Stergion, QC manager, Corning Glass Works, Corning, N. Y., will be the guest speaker.

This year, as an added feature, each meeting is sponsored by a neighboring industry. The resident manager introduces the guest speaker.

This month, John M. Roddy, plant manager of Bigelow-Sanford, Inc., Thompsonville, Conn., will introduce Mr. Stergion,

Mr. Stergion will speak on "A Practical Application of Statistical Quality Control."

Dinner at 6:30 p.m., talks at 8 p.m.

Alan J. Donnelly

WICHITA . . . The planning committee met Aug. 24 to complete plans for the 15th Midwest QC Conference October 14-15.

Program planning for the season has been completed pending confirmation of three speakers. We are obtaining outstanding speakers and look forward to a profitable season.

Curt Williams, quality manager of General Electric, Evandale, Ohio, ASQC senior member, will speak at our meeting November 1.

Howard K. Mitchell

WORCESTER . . . The executive committee held a cook out and meeting Aug. 9 at the Camp of Axel U. Sternlof, past section chairman. The speakers program was outlined by Richard L. Mark, vice chairman.

Daniel J. Burda

YOUNGSTOWN . . . On Aug. 10, an executive committee meeting was held under the chairmanship of Ronald White to discuss the program for 1960-61. The monthly dinner meetings are to be held at the Astoria Cafe the first Thursday of the month at 6:30 p.m. October through May.

Tentative plans include a plant tour and a "couples" Christmas party to be held in mid-December in addition to the usual Ladies Night in May.

On Nov. 3, the section will tour the Fisher Body plant of GMC at Euclid, Ohio.

C. T. Wirebaugh

Significant Differences

. . . Akron-Canton—**Richard Patterson,** formerly QC manager, U.S. Ceramic Tile, East Sparta, Ohio, has joined the Corning Glass Co., Corning, N. Y.

. . . Battle Creek-Kalamazoo—**Denzel Easterday,** assistant QC manager, Rich Manufacturing Corp., Marshall, Mich., has been promoted to chief shipping clerk.

. . . Buffalo—**Vernon R. Grom,** treasurer of the Buffalo section, is now QC manager of the Scott Aviation Corp., Lancaster, N. Y.

. . . Cleveland—**Paul W. Kuckuck,** formerly with Weatherhead Co., is now assistant manager with Milk Bottles Redemption Co., Cleveland, Ohio.

. . . Cumberland—**Rolland G. Frakes** has been named QC director for Celanese Plastics Co., Newark, N. J. He has been succeeded as QC superintendent at the Amcelle plant of Celanese Fibers Company by **Robert G. Walters,** who had been senior QC engineer in the Quality Engineering section.

. . . Evansville-Owensboro — **James Romerhausen,** section chairman, has been promoted from chief inspector to assistant QC manager at the Potter and Brumfield Princeton plant. Potter and Brumfield is a division of American Machine and Foundry Inc.

James Cherolis has been promoted from assistant QC superintendent to QC director at the Owensboro plant of Fleischman Distilling Co.

. . . Greater Detroit—**Irwin A. DeGrote,** formerly supervisor, quality analysis section, has been named manager of the analysis and inspection standards department, Engine and Foundry Department, Ford Motor Co., Dearborn, Mich.

Theodore Baylor, formerly QC director, Chrysler Missile Division, has joined Atlantic Research Inc.

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. . . Hartford—**Larry Sespaniak** has been promoted to supervisor of operations research in the industrial engineering department of Pratt & Whitney Aircraft, United Aircraft Corp.

Gene Ellis spoke on "Quick and Dirty Statistics" at the University of Connecticut.

Chick Chicone illustrated the method of pre-control used at Anemostat in a short course at the University of Connecticut.

. . . Kansas City—Kansas City is sorry to lose section treasurer **Don M. Thomas,** who is going to North American Rocketdyne.

. . . Lima—We wish to acknowledge these recent promotions: **G. Robertson,** superintendent engine assembly; **R. Kennedy,** supervisor quality audit; engine and customer contact section; **L. Conners,** QC foreman; **K. Schey,** Test Engineer, and **A. Smith,** inspection general foreman.

The laboratory at the Lima Engine plant, Ford Motor Co., recently employed two new men, **Jim Clark** and **John Dukro,** formerly teachers in the science and math fields, respectively.

Clair Zimmerman, section chairman, has returned from the University of Pennsylvania, where he was treated for a serious illness. Clair is coming along nicely and we are looking forward to a speedy recovery. His home address is: 1528 Oakland Parkway, Lima, Ohio.

. . . Mid Hudson—**Francis H. Delaney,** ASQC senior member, has been named QC manager of the IBM Endicott plant. Mr. Delaney was graduated from the University of Connecticut in 1948 with a Bachelor of Science degree in Electrical Engineering. He joined IBM in 1948 at Hartford, Conn., as a customer engineer. In 1952 he became a technical engineer at the Poughkeepsie plant and was promoted to project engineer, quality engineering department, in 1956. In 1958 Mr. Delaney was promoted to functional manager of Systems Quality Control.

. . . Minnesota—**Bill Parrish,** formerly QC engineer, raw materials inspection, Toni Co., St. Paul, Minn., is now with Remington Rand Univac as QC engineer in audit and reliability.

. . . Montreal—New committee chairmen are program **J. Richer,** Johnson & Johnson Ltd.; membership—**P. F. Wade,** Price Waterhouse & Co. Ltd.; education and training—**R. Lessard,** Ecole Polytechnique; publicity—**—D. Park,** Steel Company of Canada; examining—**J. B. Pringle,** Bell Telephone of Canada; auditing — **C. I. Taylor,** Trans-Canada Air Lines, and All Day Forum—**S. L. Humphries,** Aviation Electric Ltd.

. . . Northeast Tennessee—**Joe Johnston,** QC manager, Raytheon Bristol, and presently section chairman, has reorganized the QC department at the Raytheon Bristol plant. Three section heads report to the QC manager. The section heads are **Robert W. Keeney,** who is in charge of QC engineering and planning; **Charles E. Stone,** all test and standards, and **Mike Gomez,** plant inspection. Bob is the section's special services chairman; Charlie is section treasurer, and Mike is section reporter.

Jack Lockner, formerly in the QC department at Raytheon Bristol, has been promoted to assembly production supervisor.

. . . Orange Empire—**J. Morey** to production manager, Diode Division, and **E. Selfin** to QA manager, Hughes Semiconductor Division.

A. E. Candlelaria, formerly QC engineer, Epsco-West, is now QC manager, Custom Systems Co., Santa Ana.

Ed Steinmeyer, formerly section secretary, now vice president due to the resignation of **Bill Hurst.**

Ed Murachver, formerly Saddoris Award chairman, now section secretary.

Pete Graham has been elected to the chairmanship of the Saddoris award and publicity committees due to the resignation of **Bill Hill.**

Award Funds Contributions

Last spring, the chairman of the Award Funds Committee, R. Shaw Goldthwait, recommended to the executive committee that sections and divisions be requested to contribute to the Society's various award funds as a first step toward putting these funds on a self-sustaining basis.

The Society would like to acknowledge and thank the following groups for their generous response to this program:

Cincinnati	Racine
Cleveland	Rhode Island
Dallas-Fort Worth	Richmond, Va.
Kankakee-Joliet	St. Charles
Metropolitan	St. Louis
Milwaukee	San Diego
Parkersburg	Southern Connecticut
Phoenix	Wichita
Pittsfield	Winnebago

Chemical Division
Textile Division
New England Conference Council

As a result of this support, the Brumbaugh Award Fund is now almost self-sustaining; the Shewhart Medal Fund and the new Edwards Medal Fund still have a way to go.

1961 Edwards Medal Nominations

Nominations are now being received by the Edwards Medal Committee for consideration with respect to the Edwards Medal Award for 1961. The First Medalist, for 1960, was Simon Collier.

Any member or group of members of the Society may make a nomination for this honor. It is important, however, that each nomination be accompanied by suitable biographical or other information supporting the nomination so that the Committee will be able to give adequate consideration to the qualifications of the nominee.

Nominations should be sent with supporting information to the Chairman of the Edwards Medal Committee, Warren R. Purcell, Raytheon Manufacturing Co., 429 Watertown St., Newton, Mass. Nominations received by the Medal Committee on or before December 31, 1961, will receive consideration.

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SECTION CALENDAR (NOVEMBER 1 to DECEMBER 10)

SECTION	DATE	PLACE	TIME	SUBJECT	SPEAKER
Akron-Canton	Nov. 17	Iacomini's	8:00 p.m.	Modern Inspection	Edward M. Schrock, American Radiator & Standard Sanitary
Albany	Nov. 3	Hot Shoppes	4:30	How to Plan for Process Control	Frank McLaughlin, General Electric Co.
	Dec. 1	Hot Shoppes	4:30	Pursuit of Facts	Warren R. Purcell, Raytheon Corp.
Albuquerque	Nov. 14	To be announced	8:00	Air Force Quality Control 1960-62	J. G. Schneider, Colonel, USAF, Chief Quality Control, Air Materiel Command
Baltimore	Nov. 11-12	Lord Baltimore Hotel, Baltimore, Md.	9:00 a.m.	Eighth Annual Aircraft and Missile Division Conference	Several
Battle Creek-Kalamazoo	Nov. 17	KVP-Sutherland, Sutherland Division, Kalamazoo, Mich.	8:00 p.m.	Technical session: Evolutionary Operations	Brant Bonner, Dow Chemical Co., Midland, Mich.
Birmingham	Nov. 11	Hotel Bankhead	6:00	Quality Control Techniques	C. T. Raymo, American Lava Co., Chattanooga, Tenn.
Boston	Dec. 1	MIT Faculty Club	9:00 a.m.	One Day Seminar—Latest Developments in QC Tools for Process Industries	Several
	Nov. 10	MIT Faculty Club	8:00 p.m.	Cost Accounting for Quality Control	J. Y. McClure, Convair-General Dynamics Corp., Fort Worth, Tex.
	Dec. 8	MIT Faculty Club	8:00	Production Line Experimentation	Frank Caplan, Jr., Metals Division, Western Electric, Blairsville, Pa.
Merrimac Valley Sub-Section	Nov. 3	Yankee Doodle Restaurant	8:00	Malfunction Reporting	Richard Jacobs, Sylvania Electric
	Dec. 1	Yankee Doodle Restaurant	8:00	QC in a Job Shop	Frank Kilduff, Instrument Development Laboratory, Attleboro, Mass.
Buffalo	Nov. 28	Park Hotel, Lockport, N. Y.	6:30	Engineering Design Proof of Reliability	S. Sherwood
Chicago	———	To be announced	———	To be announced	To be announced
	Nov. 3-4	To be announced	9:00 a.m.	Fourth Technical Conference, ASQC Chemical Division	Several
Cincinnati	Nov. 16	Engineering Societies Building	8:00 p.m.	Selling Quality Control to the Factory	Burr Stanton, Appliance Division, General Electric Co., Louisville, Ky.
Cleveland	Nov. 18	Hotel Pick-Carter, Cleveland, Ohio	9:00 a.m.	All Day Conference on Quality Control and Reliability	12 speakers
	Nov. 18	Hotel Pick-Carter, Cleveland, Ohio	7:30 p.m.	Combining Techniques in Quality Control	Speakers from All Day Conference
Columbus	Nov. 16	Kimble Glass Corp.	8:00	QC in the Minnesota Mining & Manufacturing Co., Tape Division	J. N. Linneroth
Evansville-Owensboro	Nov. 15	Bucyrus Erie, Evansville, Ind.	7:00	Plant tour	Ed Stiles
Greater Detroit	Nov. 5	Detroit Arsenal	9:00 a.m.	All Day Conference	Several
Greater Muskegon	Nov. 10	Drelles Restaurant	6:30 p.m.	A. O. Smith Quality Viewpoint	Reginald Hislop, A. O. Smith Co.
	Dec. 9	Spring Lake Country Club	6:30	Professionalism in Quality Control	John G. Rutherford, Lear, Inc.
Hamilton-Middletown	Nov. 2	Eaton Manor, 1892 Dixie Highway, Hamilton, Ohio	6:30	Simulation Model for Salary Movement	Ralph Partridge
Hamilton	Nov. 5	McMaster University	9:00 a.m.	Fourth Annual QC Forum	Four simultaneous sessions
Harrisburg	Nov. 2	Lancaster Elks Club	6:30 p.m.	Reliability	Max Tall, RCA, Moorestown, N. J.
	Dec. 7	Yorktown	6:30	Buzz Session	Michael O'Hanlon, discussion leader
Hartford	Nov. 1	Pratt & Whitney Aircraft Co., West Hartford	6:30	Plant tour, Operations Research in Inspection	L. Sespaniak
	Nov. 15	Nutmeggar House	7:00	A to Z in Automatic Gaging	J. S. Broatch
Indianapolis	Nov. 8	Butler	7:30	Experimental Designs for Pharmaceutical Development	John Waldner, Eli Lilly & Co.
Kansas City	Nov. 17	Lantern Restaurant	7:00	Electronic Testing, Correlation, Data Collection	Vivian L. Crawford and M. R. Easterday
Lexington	Nov. 17	Lexington Signal Depot	7:00	To be announced	To be announced
Lima	Nov. 8	Ford Motor Co., Lima Engine Plant	6:30	Joint dinner meeting with American Technical Council	I. A. DeGrote, Ford Motor Co., Dearborn, Mich.
Los Angeles	Nov. 22	IAS Bldg., 7660 Beverly, Los Angeles 36, Calif.	———	Reliability Panel	Douglas Aircraft Co.
Mid Hudson	Nov. 1	DiPrima Hotel, Highland, N. Y.	8:00	Why Quality Engineering	F. J. Sindelar, W. J. Penrose, W. Cranston
	Dec. 6	DiPrima Hotel, Highland, N. Y.	8:00	How to Sell Your Ideas	Jerome Barnum
Milwaukee	Nov. 18	Stratford Hotel	7:30	Experimental Design	A. W. Wortham
Minnesota	Nov. 15	Coffman Memorial	7:30	Reliability Panel Discussion	Moderator: Robert Myers, Minneapolis Honeywell
Montreal	Nov. 9	Ecole Polytechnique	8:15	An Interview on Quality Control	B. H. Lloyd, Price Waterhouse & Co., Montreal
	Dec. 7	CIL Bldg.	8:15	Possible Solutions for Some Problems in Communication	D. Arthurs, Sir George Williams University, Montreal
Muncie	Nov. 17	Student Center, Ball State Teachers College, Muncie, Ind.	6:30	Organization and Company Approach to QC	Robert Yingst, Glasco Corp.; Richard Sowastsky, Chevrolet-GMC, and William McHenry, Albion Malleable Co.
Northeast Tennessee	Nov. 10	Bristol, Tenn.	6:00	How You Can Make a Multi-Plant QC Program Work	H. O. Hehner, Monsanto Chemical Co., St. Louis, Mo.
Northeastern Indiana	Nov. 19	Chamber of Commerce, Fort Wayne, Ind.	9:00 a.m.	Annual All Day Conference	Several
Parkersburg	Nov. 16	To be announced	———	Incoming Inspection and Vendor Relations	Frank Caplan, Westinghouse Corp.
Pensacola-Mobile	Nov. 10	Chemstrand Corp., Pensacola, Fla.	6:00 p.m.	Plant tour	J. R. Martin, Chemstrand Corp., Pensacola, Fla.
Philadelphia	Nov. 17	Germantown Cricket Club	6:15	Quality—Consumer's View of It	Sydney E. Longmaid, Esterbrook Pen Co.

Pittsburgh	Nov. 22	YWCA, Wood St. and Blvd. of Allies	6:30	What is Quality Control?	Cecil C. Craig, University of Michigan
Pittsfield	Nov. 16	Stanley Club	6:00	Monte Carlo Night, Ladies Night	Mr. and Mrs. Douglas Slingerland
Portland	Nov. 1	Public Service Bldg., Portland, Oregon	7:30	Problems in Soldering Related to Reliability	To be announced
Rhode Island	Nov. 17	Engineering Society Bldg., Providence, R. I.	8:00	Product ability Process Improvement Through Statistical Engineering	Charles W. Carter, Industrial Management Consultant
Rochester	Nov. 15	Chamber of Commerce	6:00	To be announced	E. Poldor
St. Charles	Nov. 15	Chicago Rawhide Plant, N. State St. Rd., Elgin, Ill.	5:30	Plant tour	Chicago Rawhide QC Department
St. Louis	Nov. 19	Golden Fried Chicken Loaf Restaurant	8:00	Setting Up a Quality Control Inspection System	Ray Primmer
St. Petersburg-Tampa	Nov. 14	St. Petersburg Junior College	8:00	Inter-Relation of Design, Reliability, and QC	Dr. J. B. Williams, Electronic Communications, Inc., St. Petersburg, Fla.
San Diego	Nov. 14	Sands Hotel, Clairmont Mesa Blvd., Highway 395	7:00	Quality Characteristics and Clues for Purchasing Clothing, Furniture and Household Items—Ladies Night	Mrs. Helen E. Nelson, Consumer Counsel Governor's Office, State of California
San Francisco	Nov. 14	To be announced	———	Forecasting Techniques	C. G. Parkin, Minnesota Mining and Manufacturing Co.
State University of Iowa	Nov. 18	Collins Radio Co., Engineering Bldg., Cedar Rapids, Ia.	8:00	To be announced	To be announced
Toledo	Nov. 3	EST Club Rooms, 4638 Lewis Ave., Toledo	6:30	Panel discussion	D. E. Richardson, Edward Dow, Paul Atwell
	Dec. 3	EST Club Rooms, 4638 Lewis Ave., Toledo	6:00	Christmas Party	More details later
Toronto	Nov. 2	Chreston Restaurant, Applewood Acres	6:30	Joint meeting with Industrial Engineering Association	To be announced
	Nov. 23	Study Group, CGE Auditorium 214 King St., W. Toronto	8:00	Control of Raw Material	C. S. Argyle
	Dec. 7	CGE Auditorium, 214 King St., W. Toronto	8:00	Foundry Application of QC	R. W. Gardiner, Ford Motor Co., Dearborn, Mich.
Utica	Nov. 17	Hotel Hamilton	7:30	Sampling and Inspection Costs	E. Godsey, Collins Radio Co., Cedar Rapids, Ia.
Western Massachusetts	Nov. 8	Shelton Hotel, Springfield, Mass.	6:30	A Practical Application of Statistical QC	A. P. Stergion, Corning Glass Works, Corning, N. Y.
Wichita	Nov. 1	Shirkmere Hotel	6:30	Outgoing Quality Control & Customer Complaints	Curt Williams, General Electric Co., Evandale, Ohio
Youngstown	Nov. 3	Fisher Body Plant, GMC, Euclid, Ohio	———	Plant tour	Staff

. . . Pensacola-Mobile—**B. F. Benton, Chemstrand Corp.,** has been promoted to senior QC engineer.

Fernand J. Seguin, section secretary, and **James V. Lipscomb** have recently completed the advanced statistical analysis course at the United State Air Force Institute of Technology.

Robert VanScoyk, formerly of Brookley AFB, Alabama, has transferred to Redstone Arsenal, Ala.

. . . Rhode Island—**John Pollard,** chief QC engineer, M&C Nuclear, a subsidiary of Texas Instruments Inc., spoke at the American Management Association seminar, "Organization and Management of the QC Function," at Colgate University on July 26, His subject was "QC Techniques."

. . . Southern Connecticut—**Morris E. Tyler** has joined the Precision Product Department of Northronics Division of Northrop Corp., Norwood, Mass., as a quality assurance engineer. He had lived in Middlebury, Conn., while working for Winchester Electronics.

Further promotions at Norma-Hoffman Bearings Corporation include **W. B. Clark,** from superintendent of inspection and QC to manager of manufacturing engineering, and **Frances R. Kelley,** from general foreman of inspection to chief customer representative.

. . . St. Charles—**L. B. Crawford,** QC director for the Admiral Corp., and past vice chairman of our section, is in Mexico setting up a quality program for Admiral's Mexico operation.

Albert Stoltz, section chairman, is planning a one day workshop with the help of his executive committee. It will be held later in the season.

. . . St. Louis — Editorial committee chairman **W. O. Feldmeier,** McDonnell Aircraft Corp., has been transferred to Cape Canaveral. **Sam Simpson,** Shell Oil Co., has agreed to succeed Mr. Feldmeire on this committee.

. . . San Diego—**Vern Scherkenback** and **Earl Smith,** formerly of Solar Aircraft Co., have taken positions in quality assurance at Convair-Astronautics.

Mr. Scherkenback will chairman the activities of the San Diego section during the absence of **L. I. Medlock,** who is presently on special assignment at Warren AFB, Cheyenne, Wyoming.

. . . San Francisco — **Bruno Filice** has been elected chairman, and **Stan Hotchner,** vice chairman, of the committee on quality of food products, Institute of Food Technologists.

Jerry Sessions has been transferred to the Lancaster, N. Y., Hazel-Atlas Glass Co., and has been promoted to assistant plant manager.

. . . Toledo — **Jack B. Schneider** has been appointed manager of the Bay City, Mich., division of the Electric Autolite Co. Mr. Schneider started with Autolite in January, 1959, as assistant to the chief methods engineer for the Toledo division and since last February has been manager of manufacturing methods at the Bay City plant. Before joining Autolite, he was with the Toledo Stamping & Manufacturing Company for 13 years.

. . . Wichita—**Max P. Eaton** has been placed in charge of all quality control operations at Beech Aircraft Corp. As chief of quality control, including inspection, he will be responsible for assuring high quality of the complete range of materials, from raw stage to finished product, used in Beechcraft commercial and military products. He will direct QC activities at the three Wichita plants and the Liberal, Kansas, Division, and will have an advisory and coordinative capacity for QC at the Boulder, Colorado, Div.

Mr. Eaton joined Beech 20 years ago. His entire service with the company has been in the inspection and QC field. He advanced through positions of inspector, supervisor, staff member, liaison representative, foreman and general supervisor. Since 1958, he has directed QC operating procedures, statistics, data processing, material review and corrective action.

Mr. Eaton is an alternate member of the National Securities Industries Association QC committee.

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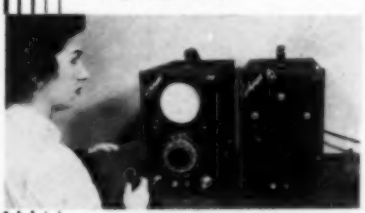

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Freyberg, Robert W., Fairfield City, Ohio
Gustafson, Edward L. Jr., Kingsport, Tenn.
Hughes, Bobby G., Fort Worth, Texas
Kear, Donald L., Dayton, Ohio
Lawrence, Charles S., Winston-Salem, N. C.
Luethje, Dean H., Lincoln, Nebr.
Oates, Monroe J., Louisville, Ky.
Palazzi, Aurelio, Genova, Corngiano, Italy
Sandelius, D. Martin, Amal, Sweden
Smith, William D., Liberty, Ind.
Stiles, Edward M., Evansville, Ind.
Walner, Arthur, Flushing, N. Y.
Yurgens, Philip J., Glenview, Ill.

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(as of August 19, 1960)

Fabian, Robert A., Rockland, Mass.
Moreland, William R., Lima, Ohio
Shute, William F., Sudbury, Mass.

ADMISSIONS TO GRADE OF MEMBER
(as of July 31, 1960)

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Arnold, John W., Wichita, Kans.
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Beck, Harold B., Wichita, Kans.
Beers, Lloyd C., East Meadow, N. Y.
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Bellah, Grover G., Richardson, Tex.
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Berges, G. Alejandro, Santa Fe, D. F. Mex.
Bird, Peter F., Santa Clara, Cal.
Blamy, John F., Pontiac, Mich.
Bocan, August, Phoenix, Ariz.
Brower, E. Corson, Mansfield, Ohio
Brown, Richard R., Newark, N. Y.
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Castner, Thomas J., Trenton, Mich.
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da Silva, Timothy M., Dallas, Tex.
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Flontek, Joe, Battle Creek, Mich.
Folks, John L., Richardson, Tex.
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Gillingham, Ernest L., Ft. Worth, Tex.
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Priddy, Jean E., Dallas, Tex.
Puhr, John J., Mobile, Ala.
Quirk, Raymond W., St. Lambert, Que., Can.
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(as of August 19, 1960)

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STUDENT ENROLLMENTS
(as of August 19, 1960)

KRATOCHVIL, RALPH O., West Allis, Wis.

clinics, conferences, and courses

OCTOBER

. . . **24-28**—15th Engineering Conference, Robert Meyer Hotel, Jacksonville, Fla., sponsored by the Technical Association of the Pulp and Paper Industry (TAPPI), contact Eleanor Ney Wark, Technical Association of the Pulp and Paper Industry, 360 Lexington Ave., New York 17, N. Y.

. . . **25—Basic Quality Control Series for six consecutive Tuesday evenings at the Wentworth Institute, sponsored by the Boston ASQC section, contact Robert Fabian, 256 Plain St., Rockland, Mass.**

. . . **31-Nov. 2**—13th Annual Conference on Electrical Techniques in Medicine and Biology, Sheraton Park Hotel, Washington, D.C., sponsored by ISA, AIEE, IRE, contact Dr. R. L. Bowman, National Heart Institute, Bethesda 14, Maryland.

. . . **31-Nov. 5**—One-week course in packaging management, Hotel Astor, New York City, sponsored by the American Management Association. Contact American Management Association, 1515 Broadway, Times Square, New York 36, New York.

NOVEMBER

. . . **3-4—Fourth Technical Conference, Chicago, Ill., sponsored by the ASQC Chemical Division, contact Karl J. Bauer, Abbott Laboratories, North Chicago, Ill.**

. . . **5—Fourth Annual QC Forum, McMaster University, Hamilton, Ont., jointly sponsored by the Hamilton and University of Western Ontario ASQC sections. Contact Carmen C. Cantlon, Canadian Westinghouse Ltd., Hamilton, Ont.**

. . . **7**—Plastics and Automatic Control SPE Regional Technical Conference at the King Edward Sheraton Hotel, Toronto, Ont., Canada, sponsored by the SPE Ontario section. Advance registration fee, which includes preprint book and luncheon, is $7.50 for SPE members and $9.00 for non-members. Contact John D. Glen, chairman, registration committee, Canadian Industries, Ltd., 1303 Yonge St., Toronto, Ont., Canada.

. . . **11-12—Eighth Annual Aircraft and Missiles Division Conference and Middle Atlantic Conference, Lord Baltimore Hotel, Baltimore, Md., contact Stanley Kalin, Dept. 251, Bendix Radio Corp., Baltimore 4, Md.**

. . . **15-16**—Symposium on Engineering Applications of Probability and Random Function Theory, Lafayette, Ind., sponsored by Purdue University. The symposium will stress applications of probability and random function theory Contact J. L. Bogdanoff or F. Kozin, Symposium co-chairmen, Division of Engineering Science, Purdue University, Lafayette, Ind.

. . . **18—All Day Conference on Quality Control and Reliability, sponsored by the Cleveland ASQC section, at the Pick-Carter Hotel, Cleveland, Ohio, contact L. S. Nelson, General Electric Co., Nela Park, East Cleveland 12, Ohio.**

. . . **19—Annual All Day Conference sponsored by the ASQC Northeastern Indiana section at the Chamber of Commerce, Fort Wayne, Ind., contact Howard F. Spicer, 712 Home Ave., Fort Wayne, Ind.**

. . . **26—Windsor All Day Quality Control Forum at the Cleary Auditorium and Memorial Convention Hall, Windsor, Ont., Canada, sponsored by the Windsor, Ont., ASQC section. Contact Kenneth Crew, 464 Mathew Brady, Riverside, Ont., Canada.**

DECEMBER

. . . **1—One Day Seminar on the latest developments in QC tools for the process industries, MIT Faculty Club, sponsored by the Boston ASQC section, contact Robert Fabian, 256 Plain St., Rockland, Mass.**

. . . **12-15**—Winter Meeting of American Nuclear Society at the Mark Hopkins Hotel, San Francisco, Calif., contact American Nuclear Society, 86 East Randolph St., Chicago 1, Ill.

. . . **13-15**—Tenth Annual Eastern Joint Computer Conference (EJCC), Hotel New Yorker and Manhattan Center, sponsored by the National Joint Computer Committee, which consists of representatives of the Institute of Radio Engineers, the American Institute of Electrical Engineers, and the Association for Computing Machinery. Contact P.O. Box 2580, Grand Central Station, N. Y. 17, N.Y.

. . . **14-16**—Second Annual Seminar on Color Control for the Graphic Industries at the Rochester Institute of Technology, Rochester, N.Y. Topics include fundamentals of color, color specification, illumination, color vision, inspection and process control. Contact Harold Kentner, director of Extended Services, Rochester Institute of Technology, Rochester 8, N.Y.

JANUARY

. . . **8—Measurement Series on eight consecutive Monday evenings at the Wentworth Institute, sponsored by the Boston ASQC section, contact Robert Fabian, 256 Plain St., Rockland, Mass.**

. . . **9-11—Seventh National Symposium on Reliability and QC, Bellevue-Stratford Hotel, Philadelphia, Pa., sponsored by the IRE, AIEE, EIA, and ASQC. Contact R. L. Schwerin, vice chairman, publicity committee, ACF Electronics Div., ACF Industries, Inc., 11 Park Place, Paramus, N.J.**

. . . **11-12—Two Day National Seminar on Quality Control, St. Louis, Mo., co-sponsored by ASQC and ASTME, contact ASTME, 10700 Puritan, Detroit 38, Mich.**

. . . **16-18—Fifth ASQC Workshop-Seminar, Penn Sheraton Hotel, Pittsburgh, Pa., Paul C. Clifford, director, professor at Montclair State**

CONGRATULATIONS

The Society welcomes to its family of divisions the new

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College. Address inquiries to: Fifth ASQC Workshop-Seminar, ASQC, 161 W. Wisconsin Ave., Milwaukee 3, Wis.

. . . **16-19**—ISA Winter Instrument-Automation Conference & Exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis, Mo., contact William H. Kushnick, executive director, ISA, 313 Sixth Ave., Pittsburgh 22, Pa.

. . . **23**—Ten day 1961 Engineering and Management Course, UCLA campus, contact Reno R. Cole, coordinator, College of Engineering, University of California, Los Angeles 24, Calif.

FEBRUARY

. . . **9—Thinking Tools for Engineers Series for ten consecutive Tuesday evenings, location to be announced, sponsored by the Boston ASQC section, contact Robert Fabian, 256 Plain St., Rockland, Mass.**

. . . **14—One Day Clinic at the Hotel Lowry, St. Paul, Minn., sponsored by the Minnesota ASQC section, contact Kenneth L. Sundeen, Minneapolis Honeywell Regulator Co., 2753 4th Ave. South, Minneapolis, Minn.**

. . . **18-20—Tenth Annual Textile Division Conference, Clemson House, Clemson, S. C., contact R. G. Mitchell, International Latex Corp., Dover, Del.**

MARCH

. . . **20-24**—Twelfth Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles, Calif., sponsored by American Society for Metals, Metals Park (Novelty), Ohio.

APRIL

. . . **6-8—Sixth ASQC Workshop-Seminar, Hotel Roosevelt, New York City, Paul C. Clifford, director, professor at Montclair State College. Address inquiries to: Sixth ASQC Workshop-Seminar, ASQC, 161 W. Wisconsin Ave., Milwaukee 3, Wis.**

. . . **12-14**—Third Symposium on Information and Decision Processes, Purdue University, Lafayette, Ind. Contact Purdue University.

MAY

. . . **9-11**—1961 Western Joint Computer Conference, Ambassador Hotel, Los Angeles, Calif. Papers on systems, applications and circuitry for both digital and analog computers. Submit summaries of papers by Dec. 15 to C. T. Leondes, associate professor of engineering, Department of Engineering, University of California, Los Angeles 24, Calif.

JUNE

. . . **26-July 1**—International Measurement Conference at the Engineering Societies Bldg., Budapest, Hungary. Proposals concerning papers to be read or inquiries concerning details should be directed to J. Johnston, Jr., president of the Instrument Society of America, Dupont de Nemours, Wilmington 98, Delaware, or write directly to IMEKO Secretariat: Budapest, 5. POB 3.

ASQC Annual Convention

Future Dates

June 5-7,	1961	Philadelphia
May 23-25,	1962	Cincinnati
May 20-22,	1963	Chicago
May 4-6,	1964	Buffalo
May 4-6,	1965	Los Angeles
June 1-3,		New York

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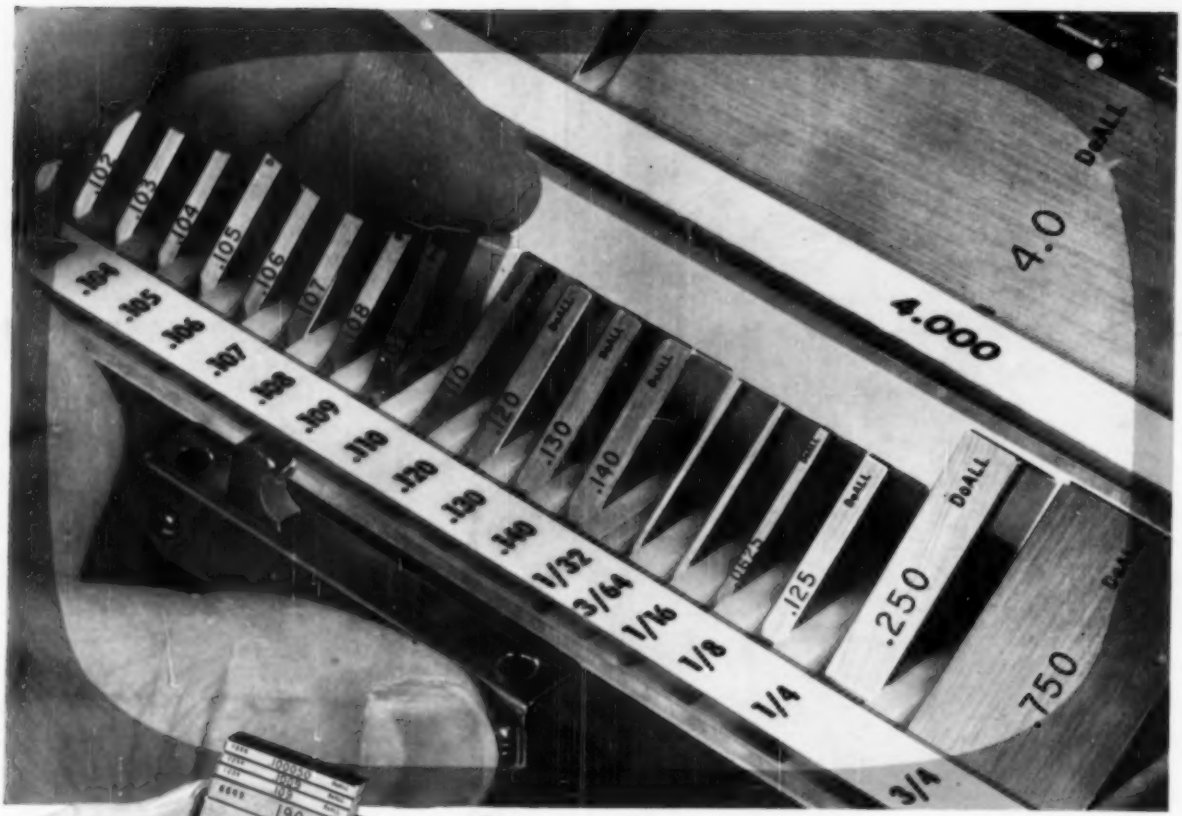

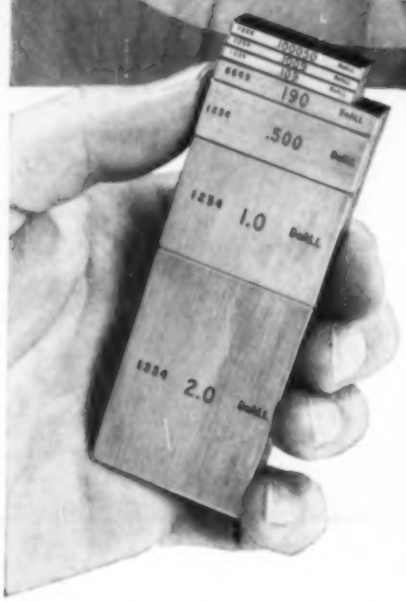

The clearly etched size designations on the new DoALL gage blocks make it easy to check the combination *after wringing*. The figures form a column that's quickly added when verification is necessary.

2 IMPORTANT IMPROVEMENTS

to save time and increase service life of standard steel or stainless steel

DoALL GAGE BLOCKS

Just out! A brand-new self-indexing pocket case that saves time in finding and removing the *correct* gage block—without touching other blocks or gaging surfaces. And a new and better way of showing size designations on the individual gage blocks.

DoALL's new index case is designed to show the size marking on the block itself and its correct slot in the case at all times—even when the case is completely filled. It's faster and easier to use.

The new method of etching size designations on the side, or non-gaging surface, lets the user see the size of each block at all times—even *after the blocks have been wrung* together. No more disassembling to double-check the combination. And the size markings line up to form a column that's easily checked against your list of required blocks.

DoALL gage blocks have long been quality leaders in accuracy, hardness, long life and now, the only blocks available in ultra-stable stainless steel. These important improvements are unmatched—anywhere. Call your local DoALL store and ask the gage specialist for complete information!

GB-38

This is a typical DoALL Store

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Sales-Service Store